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the OIL AND GAS JOURNAL

FEBRUARY 23, 1959

Beginning . . .
WPRA El Dorado Refining Quiz
p. 120

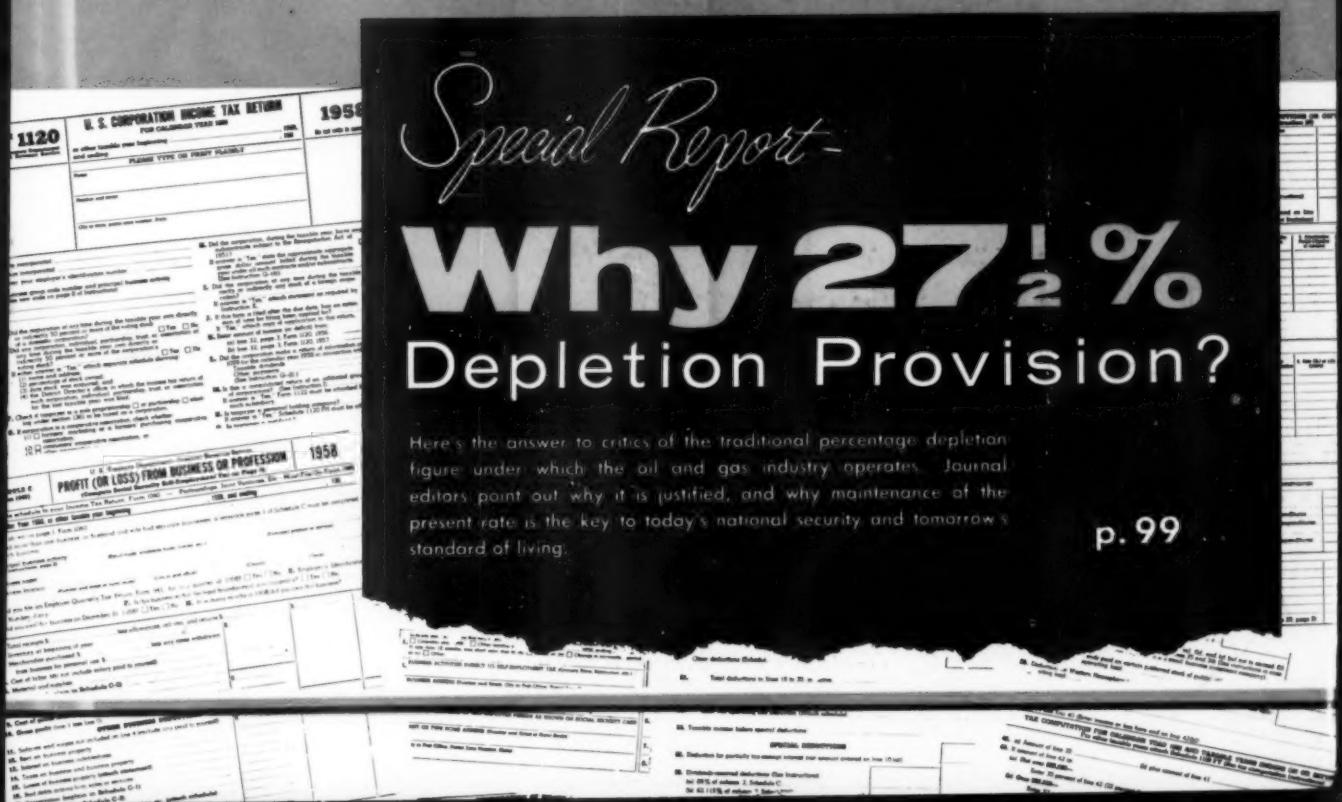
What about those foreign price cuts?

Journal study shows U. S. crude has dropped 12½ cents in 2 years. Oil men wonder: Do cuts abroad end the cycle or start a new round?

p. 71

Laurel products line first to use 24-in. pipe

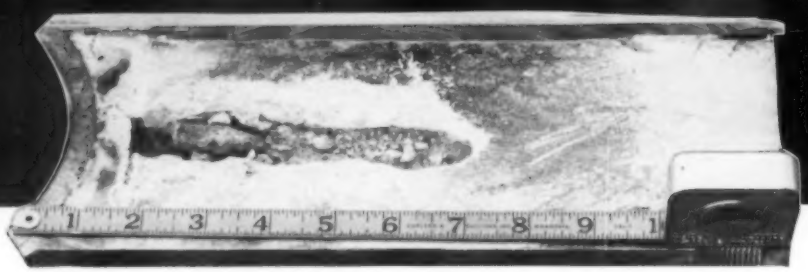
p. 115


Special Report-
Why 27½%
Depletion Provision?
Here's the answer to critics of the traditional percentage depletion figure under which the oil and gas industry operates. Journal editors point out why it is justified, and why maintenance of the present rate is the key to today's national security and tomorrow's standard of living.
p. 99

20% GREATER PENETRATION

... with Lane-Wells TOP

True Ogive Projectile



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the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
Feb. 23, 1959

U. S. producers have lost half of their last price hike:

Some have lost much more. But the weighted average of price cuts in the last 17 months is 12.5 cents a barrel, new Journal study shows. The last price hike averaged 25 cents.

Here's how the cuts stacked up: They ranged from 3 to 50 cents a barrel. Some crude has been cut twice. Every oil area of the nation was cut except East Texas (p. 71).

The results: 7,896,510 bbl. daily of crude has been involved in price cuts. Gross loss to producers is $892,100 daily. Adjustments have raised prices on 480,800 bbl. daily for gain of $43,485 daily. Net producer loss: $848,615 daily.

Texas producers suffered biggest loss, $248,209 daily, California was second with loss of $247,600 daily.

Outlook, the economists say, favors a period of stability for prices. They point to improving demand and firmer product prices. Trend, however, could be upset if imports should go uncontrolled or if foreign production should be boomed.

▼ ▼ ▼

Heavy winter demand for distillate has encouraged refiners to set production records this month.

The processors set an all-time high for distillate output last week and did it with lower crude runs. Distillates averaged 2,203,000 bbl. daily from 7,954,000 bbl. daily of crude. This is a yield of 11.6 gal. or 27.69% from each barrel of crude.

Records set in each of the 2 previous weeks showed only 10.8 and 11.2 gal. of distillate per barrel of crude.

▼ ▼ ▼

Active rotary rigs increased again last week—this time up 31 to 1,826 in the U. S.

This is still 85 rigs below same week last year, but one big difference: Rig activity started its upturn late in February this year while the upturn didn't come until late March in 1958.

Other indicators: Completions are up 47 to 899 for week. Production is off 52,391 bbl. daily to 7,167,913 and refinery

runs also are off 71,000 bbl. daily to 7,954,000. Total imports were 1,848,500 bbl. daily. Gasoline stocks climbed by 1,212,000 bbl. daily; stocks of crude and other products all dropped.

▼ ▼ ▼

Prospects of severance taxes in Wyoming and Colorado dim.

In Wyoming, the house revenue committee has recommended against passage of bill calling for 2% levy on annual gross production of oil, natural gas, and iron ore. Gov. Joe Hickey earlier had opposed any new taxes on industry.

In Colorado, the minerals subcommittee of the governor's advisory committee on natural resources has dropped demand for severance tax on oil and gas production. Instead group now favors tax policies designed to encourage development of the state's mineral resources.

Legislative committees in Nebraska and South Dakota are considering amendments to conservation laws.

▼ ▼ ▼

Look for Magnolia to become even more aggressive in marketing this year.

Company's budget for service-station construction and modernization has been more than doubled for 1959. Cash outlay for this work will exceed $5 million.

Magnolia marked up a 4% gasoline sales gain last year despite the recession. It is optimistic that increased demand for oil products this year will offset the trends of rising costs and added taxes.

▼ ▼ ▼

Venezuela's new minister of mines and hydrocarbons is Dr. Juan Pablo Perez Alfonso.

President Romulo Betancourt, as expected, named his old colleague to head the important post dealing with oil. New oil policy has not yet fully developed, but oil men expect the push to continue for greater government participation in oil affairs.

Other cabinet ministers include Luis Augusto Dubuc, interior; Ignacio Luis Arcaya, foreign relations; Dr.Lorenzo Fernandez, development; Santiago Hernandez Ron, public works; Dr. Arnaldo Gabaldon, public health; Victor Gimenez Landinez, agriculture; Luis Hernandez Solis, labor; Dr. Lopez Rivas, communications.

New Pemex regime plans more emphasis on exploration and drilling. The goal this year: 477 wells, 121 exploratory tests and 356 development wells (p. 91).

Drilling activity is part of a broad plan mapped out by Director Gutierrez Roldan, including $60 million in new loans abroad, management reforms, pipeline and refining projects.

Russian expert has gone out on a limb by estimating the crude reserves in Cambay region of Western India at more than 200 million barrels.

Guess is made on basis of coring and seismic work alone. No discoveries have yet been made except for some shallow gas pockets.

India is counting on production of 30,000 bbl. daily from Cambay to meet its domestic production target of 200,000 bbl. daily by 1967. Another 70,000 bbl. daily is expected from Assam Oil Co. fields. Rest supposedly will come from oil pools so far unfound.

▼ ▼ ▼

New well-logging methods may have great significance.

SEG President McCollum says improved methods promise to give geophysicists basic facts sorely needed for better interpretation of the mass of data made available by new tools.

He lists most important new tools as magnetic recording of seismic signals and high-speed digital computers. He says earth scientists now must become more interested in developing new well-logging methods and applying them to oil finding.

McCollum discussed these trends with Canadian geophysicists. He told them geophysics has saved Canadian oil finders money by helping pin point the more elusive small producing fields.

Drilling activity in Western Canada is off to its slowest January start in 2 years.

Completions for the month were 177 compared to 197 in 1958 and 224 for January of 1957. The breakdown shows:

...Alberta 111, of which 64 were oil successes, 8 gassers, and 39 plugged and abandoned.

...Saskatchewan 55, with 35 oil and 20 dry.

...Manitoba 3, with 2 oilers.

...British Columbia 8, with 2 oilers, 1 gas, 5 dry.

But explorationists say to watch Western Canada this year for reef news.

First reef strike of the year is Hudson's Bay and Union Oil's 10-14 Eaglesham, 15 miles southwest of Normandville field. The D3 pay gave up gas and oil on drill-stem test.

▼ ▼ ▼

South Mississippi's revived Tuscaloosa-sand play continues to spread.

New discovery by Marshall R. Young in eastern Franklin County extends West Lincoln Tuscaloosa field more than 2 miles west. The Young 1 Central flowed 300 bbl. daily of 41°-gravity oil through ½-in. choke at 10,622-48 ft.

Meanwhile, 20 miles southeast on the Lincoln-Pike county line, the prolific Little Creek field whose discovery a year ago inspired the Tuscaloosa revival still gets a hot play.

Deeper drilling in North Louisiana and South Arkansas is getting a new boost from a prolific Smackover oil strike in the old Haynesville area.

Jackson-Cheyenne Oil 1 Greene Unit discovery flowed 726 bbl. daily of 46.9°-gravity oil through 18/64-in. choke from pay at 10,383-10,497 ft.

It's one of North Louisiana's best Smackover wells and is only a quarter mile south of the Arkansas line and a mile from Haynesville's much shallower Pettet sand wells.

▼ ▼ ▼

Refiners faced with increased alkylate requirements and limited butylene feed stocks will be interested in Magnolia's experience to date with a new sulfuric-acid unit charging 85% propylene.

Acid-consumption rate on unit has been about 0.6 lb. per gallon of alkylate produced. This is roughly half the expected rate of consumption when unit was built. With an output of 8,000 bbl. daily of alkylate, immediate savings are quite apparent.

Significance: Propylene will become more attractive as a feed stock for alkylate.

Prime feed stocks heretofore have been butylene and isobutane. But with increased alkylate demand for high-octane motor-fuel blending, refiners have been forced to include more propylene in the charge. This has meant more expensive processing because it required higher acid use.

With acid consumption no longer such a big factor, refiners now can turn more and more to propylene as a charge.

Butane isomerization also is on the upswing.

Last year only three plants were under way. Preliminary reports to the Journal's annual refining survey show at least eight plants now on stream and two more scheduled this year.

▼ ▼ ▼

Big jump in demand for casing, tubing, and line pipe is reflected in Lone Star Steel operations.

Texas steel maker has stepped up operations to highest levels since 1957. First-quarter shipments are expected to be up 150% over the same period last year.

Back of the heavy steel demand: Inventory building partly as hedge against steel strike and increase in pipeline building in wake of new "Memphis" decision.

Merger of El Paso Natural and Pacific Northwest still has a long way to go to win government sanction.

Hearings before FPC examiner were wrapped up in January, but companies have until June 1 to file reply briefs. FPC ruling may not come for several months after that.

Even if FPC approves merger, companies still face anti-trust case filed by Justice Department in Salt Lake City.

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Good Wells Make Good News

A Monthly Report on Wells That Are Now Worth More

February 23, 1959

Here are results of some recent fracturing treatments performed by Dowell, using three of Dowell's ten basic fracturing services.

- **Lea County, New Mexico** (New Oil Well) Pay zone was the Grayburg sand between 4190 and 4209 feet. On initial test there was no production. After a 500-gallon regular acid treatment, well tested only a show of oil. Operator ordered Sandfrac®, using 20,000 gallons refined oil with 40,000 pounds sand. Injection was down casing at 20 bpm and 2900 psi. After clean-up, well tested 300 bopd. Other wells in the area treated with only 10,000 pounds sand have tested only 135 bopd.

- **Bossier Parish, North Louisiana** (New Gas Well) This well made only a show upon completion. Perforations were from 6233 to 6244 feet into the Travis Peak sand. Operator suspected that loss of mud into the formation was blocking production. He had Dowell acidize with 1500 gallons Mud Acid, after which well flowed 460 mcfd into line. To increase production further he ordered Stratafrac®, using 3500 gallons acid-kerosene emulsion with 2400 pounds sand. This was followed by 500 gallons Dowell acid with a silicate control agent added. Over 60 days after fracturing, well was still delivering 1516 mcfd to the line.

- **Clark County, Illinois** (New Oil Well) This well, completed in a 15-foot section of the tight Trenton lime, made only a show of oil and gas. Operator ordered Riverfrac®, using 155,000 gallons water with demulsifying agent and 20,000 pounds sand. 150 pounds temporary plugging agent were also used. Injection rate averaged 40.6 bpm at 1800 psi maximum pressure. After clean-up, initial production was 70 bopd flowing.

- **Liberty County, Texas Gulf Coast** (Old Oil Well) This well was dually completed into two sections of the tight Frio sand. Perforations were 8944 to 8971 and 9013 to 9068 feet. Production had declined to 40 bopd. The operator decided to fracture both zones separately and ordered Stratafrac. The lower zone was isolated and fractured with 6000 gallons fluid and 10,000 pounds sand. Then the upper zone was isolated and fractured with 6000 gallons fluid and 15,000 pounds sand. After both zones cleaned up, production from the lower sand stabilized at 45 bopd and from the upper at 55 bopd. This was a net production increase of 60 bopd and the entire treatment cost was paid out in less than two months.

Your Dowell representative can help you select the best treatment for your well. If fracturing is indicated, he can help you decide treatment size, the fluid to be used, amount of sand, injection rate, etc. For detailed information or prompt service, call the Dowell engineer in your area. In Canada, contact Dowell of Canada, Ltd.; in Venezuela, United Oilwell Service. Or write Dowell, Tulsa 1, Oklahoma.

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The OIL AND GAS JOURNAL

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IN THE NEWS

General Interest:

Period of Stable Crude Prices May Be Ahead 71
Latest Price Cuts Were Expensive, Journal Survey Shows 73
API Urges New Approach to Highway Financing 75
Government's Bill of Particulars Isn't Particular 80
Grand Jury Takes a Look at Denver Price War 81
Natural Gas Making Bigger Inroads in Energy Market 84
Photos in the NEWS 88

Pipelining:

Pipeline Briefs 80
Oil Men Protest Proposed California Gas Line 82
First West Texas Gasoline Due for Great Lakes System 87
FPC Examiner Reduces Proposed 16-Cent Gas Price 90

Foreign News:

Pemex Plans Big Expansion in Exploration 91
Pan Am Gets Producer in Its First Well in Argentina 92
Flying Boat Makes Seismic Survey in Pakistan 92
Russia Has Chance to Double Crude-Oil Output by 1965 93
More Gas for Venezuelan Urban Users Promised 93
West German Fuel-Oil Sales Continue to Rise 93
Tough Hurdles Ahead for Firms Operating Abroad 94

Drilling-Production:

Union and Ohio Will Drill Three Alaskan Wildcats 77
Bisti Operators Speed Unitization, Recovery Plans 78
Gulf May Sell Citronelle Interests 74
Michigan Spacing Ruling Will Spur Development 81

Exploration:

Lease Play Hits Area North of Arctic Circle 76
Economics Will Be Important Topic at Geology Meet 183
A Good Year for Simpson in Southern Oklahoma 184
January Well Completions 197

Processing:

Some Action on Imports Controls Due This Week 74
Labor Scoreboard: Three Strikes, One Settlement 77
Processing Briefs 84
Sun Forms Joint Company to Produce Polypropylene 85
Chemical Industry Sets New Record in Construction 90

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SPECIAL REPORT: THE CASE FOR 27½% DEPLETION

Why the Issue Is Important . . . 100
Why Percentage Depletion? . . . 101
How It Started . . . 101
Why Depletion Percentages Differ . . . 103
How Depletion Is Figured . . . 104
How Is It Working? . . . 105
Suppose We Cut It? . . . 105
Depletion and Conservation . . . 110
How About a Sliding Scale? . . . 111
Is 27½% Enough? . . . 112
What of Substitutes? . . . 113
What of Oil's Future? . . . 114

TECHNOLOGY—OPERATION

Pipelining

Laurel Products Line Is First to Use 24-In. Pipe . . . 115

By Paul Reed

This new line will provide cheaper transportation from Philadelphia area refineries to large Pennsylvania and Ohio markets. Initial throughput will be 90,000 bbl. per day. Within 5 years this is expected to rise to 150,000 bbl. per day. Design of the system is outstanding in advancing techniques for low per barrel-mile costs for handling very large volumes.

Pipeline Construction Report . . . 153

Refining-Processing

WPRA Refining Quiz—1: Catalytic Reforming . . . 120

Here is the material developed on catalytic reforming at the latest El Dorado, Ark., regional meeting of Western Petroleum Refiners Association. This is a portion of the transcript for the 2-day session. The remaining material will be published in future issues of the Journal.

Questions on Technology . . . 152

Sensitivity and susceptibility of alkylate.

Drilling-Production

Miscible-Phase Floods May Precipitate Asphalt . . . 137

By Robert B. Bossler and Paul B. Crawford

The ability of the LPG's to precipitate asphalts, waxes, and heavy lube oils from crudes sounds a warning to operators planning a miscible-phase flood. The tendency toward precipitation decreases as the molecular weight of the injected miscible fluid increases. Precipitated asphalt or heavy material may result in disastrous effects.

Offshore Rig Designed for Safety . . . 147

By Dave Stormont

The West Coast's first self-contained platform not only introduces a 25-well derrick capable of dual drilling, but it also sets new standards for the protection of personnel and equipment. No effort was spared in preventing pollution and keeping drilling noises down. It is currently working in 100-ft. water about 2.2 miles offshore.

DEPARTMENTS

Advertisers' Index . . . 211
Calendar of Events . . . 57
Classified Advertising . . . 207
Drilling Contractors . . . 181
Drilling Statistics . . . 203
Editorial . . . 67
Equipment Men in the News . . . 174
Exploration Highlights . . . 183
Foreign News . . . 91
Journally Speaking . . . 65
Markets . . . 206
New Equipment . . . 162
Personals . . . 199
Pipeline Construction Report . . . 153
Questions on Technology . . . 152
Refining Statistics . . . 205
Statistical Summary . . . 202
Supply Statistics . . . 204
They Say . . . 54
Trade Literature . . . 172
Watching Washington . . . 75

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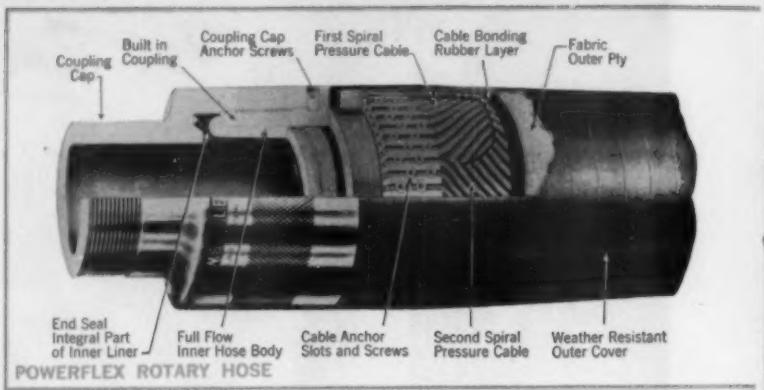
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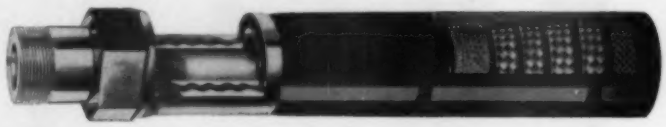
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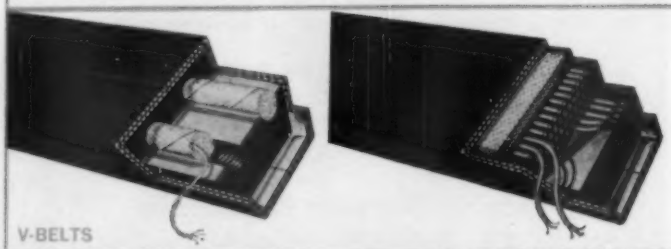
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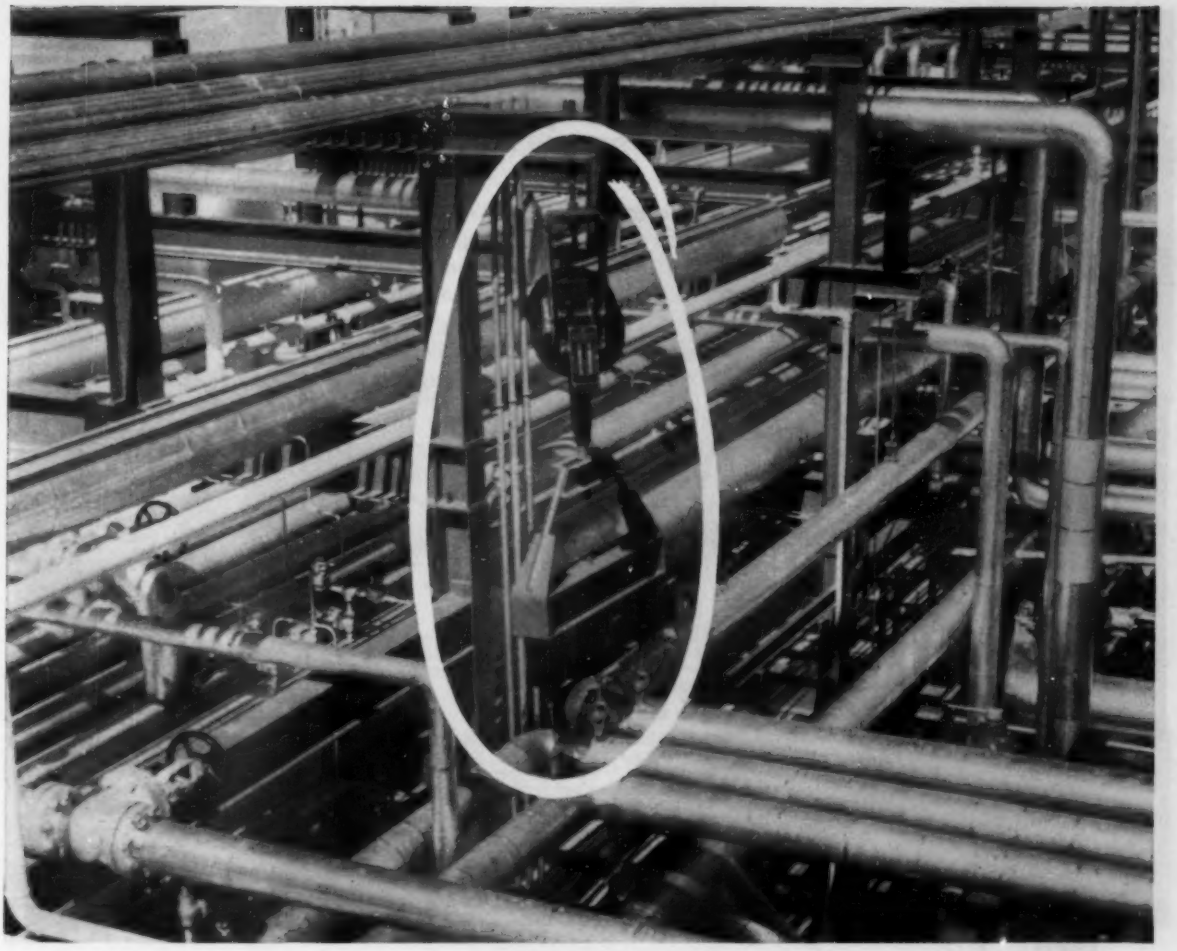

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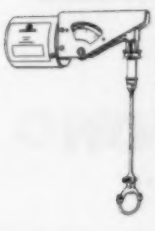


GRINNELL CONSTANT SUPPORT HANGERS maintain full safety factor in high temperature, high pressure piping. Compact design — extended range of sizes for loads from 27 lbs. to 57,500 lbs., with travels up to 16 inches.

GRINNELL VARIABLE SPRING HANGERS provide minimum variation in supporting force — a variation of only 10½% of rated capacity per ½" deflection for standard spring models. 21 sizes in standard, short and double spring models — capacities, 50 lbs. to 28,200 lbs.

*Patented

GRINNELL

AMERICA'S #1 SUPPLIER OF PIPE HANGERS AND SUPPORTS

give better OFF-SHORE service at less cost!

Now, Halliburton's specially trained *combination operators* . . . experienced in all phases of testing—treating—squeezing and all well completion operations . . . save offshore owners valuable time and money.

Better coordination results when one thoroughly skilled Halliburton offshore specialist is available full time on the rig. Savings mount up since there is less shore to site activity and extra personnel are usually not required. Adequate tools and materials are kept at the site to cover all normal completion operations.

These operators are also fully familiar with offshore equipment such as the portable cementing skid units installed aboard for cementing and high pressure pumping protection . . . as well as any chemical treatment, fracturing technique or well stimulation operation.

Insist on the best offshore service. Get the details about Halliburton's combination operators by calling Halliburton now!

HALLIBURTON

OIL WELL CEMENTING COMPANY

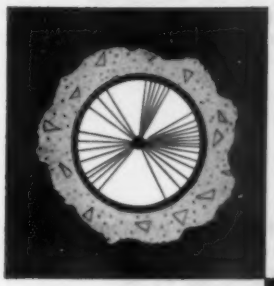
Duncan, Oklahoma

Halliburton's versatile POZMIX cements yield greater Offshore savings

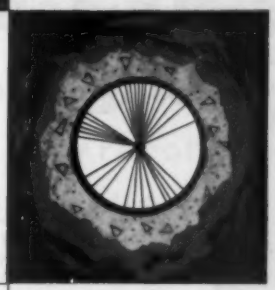
Halliburton's standard Pozmix blend, *stored aboard the offshore drilling rig,* is sufficient for cementing operations from the mud line to 14,000 feet. Versatile Pozmix Cement is easily accelerated with additives for conductor jobs and shallow plug backs. Costs of moving fresh water are virtually eliminated since sea water can be used with Pozmix for surface and intermediate string jobs.

Halliburton's Pozmix 140 is also used in offshore operations. This blend with hydrated lime is formulated for use in wells from 6,000 to 20,000 feet and deeper... at temperatures from 140°F to 400°F and higher.

Join the many other satisfied offshore operators—put Pozmix to work for you full time.



POZMIX

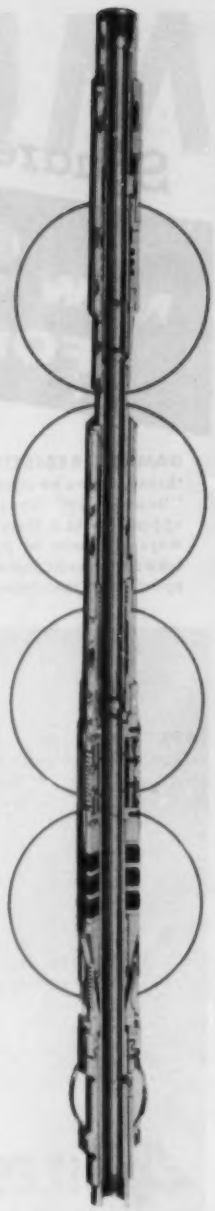


POZMIX 140

HR-4

HR-4 WORKS WELL WITH POZMIX CEMENTS

Halliburton's HR-4 retarder converts standard Pozmix to an excellent blend for cementing, squeezing and plug backs at moderate depths and Pozmix 140 for deeper depths and higher temperatures.



RTTS PACKER

RTTS PACKER (Retrievable-Test-Treat-Squeeze)

Here's one dependable combination tool that Halliburton offshore specialists rely on for one or more jobs on a single trip... acidizing, fracturing, testing or squeeze cementing. Simple tubing manipulation operates the RTTS Packer which has full opening mandrel for treatment with large fluid volumes or passage of tubing type perforating gun. Safety joint with drillability features for squeeze cementing. Circulating valve to equalize tubing and annulus pressures at Packer when desired.

Request New Pozmix Manual

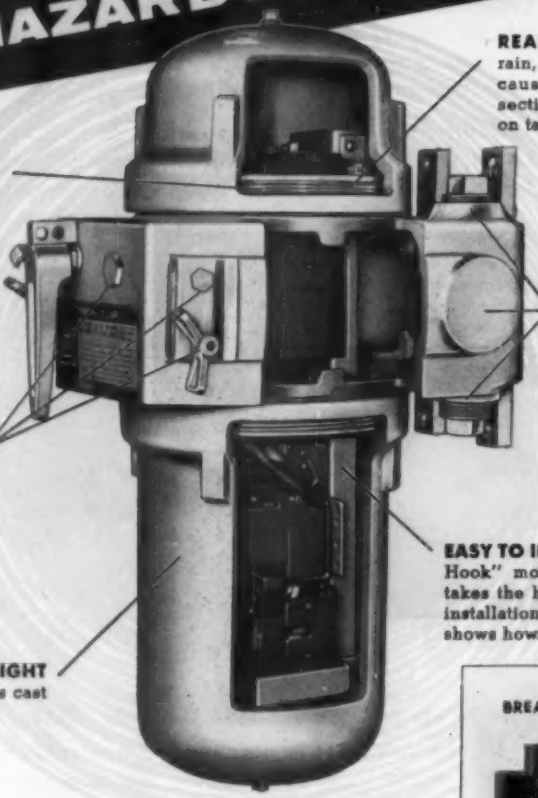
A new complete 52-page guide to Halliburton Pozmix Cements... containing a wealth of useful information and data... is yours for the asking.

OFFSHORE SERVICES

All-Ways The Leader In Advanced Offshore Services

Square D announces...

NEW SPIN TOP ENCLOSURE FOR HAZARDOUS LOCATIONS



REAL PROTECTION against rain, dust, dirt and weather because male threads on collar section engage female threads on tank.

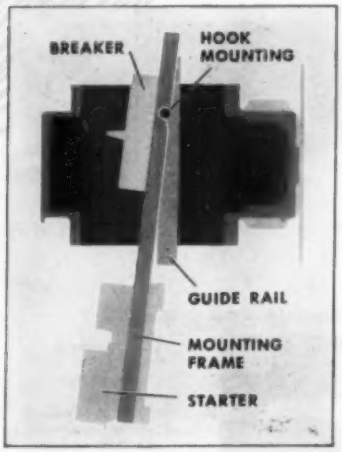
DAMAGE-RESISTING Acme thread. If you've struggled with "banged-up" threads, you'll appreciate this feature. It's always a breeze to put on and take off tanks for installation, inspection or maintenance.

INCREASED WIRING SPACE and through-feed conduit entrances for horizontal tap-offs.

EASY TO ADD pushbuttons or selector switches with easy-to-buy, easy-to-use "off-the-shelf" parts kits.

EASY TO INSTALL • "Slide and Hook" mounting arrangement takes the hard work out of the installation job. Diagram below shows how.

STRONG and LIGHTWEIGHT The complete enclosure is cast aluminum.



SLIDE and HOOK MOUNTING

4 SIZES FOR STARTERS SIZE 0 THROUGH 5

CLASS I, GROUP C and D • CLASS II, GROUP E, F, and G

The new **SPIN TOP** enclosure is available from your Square D Distributor in three ways—complete device, enclosure only, or components only...for reversing and non-reversing across-the-line starters and combination starters. And for combination and non-combination two-speed starters.

Write FOR BULLETIN 9990

Square D Company, 4041 North Richards St., Milwaukee 12, Wis.

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

ALUMINUM GATE VALVES

BY DARLING

FEATURING:

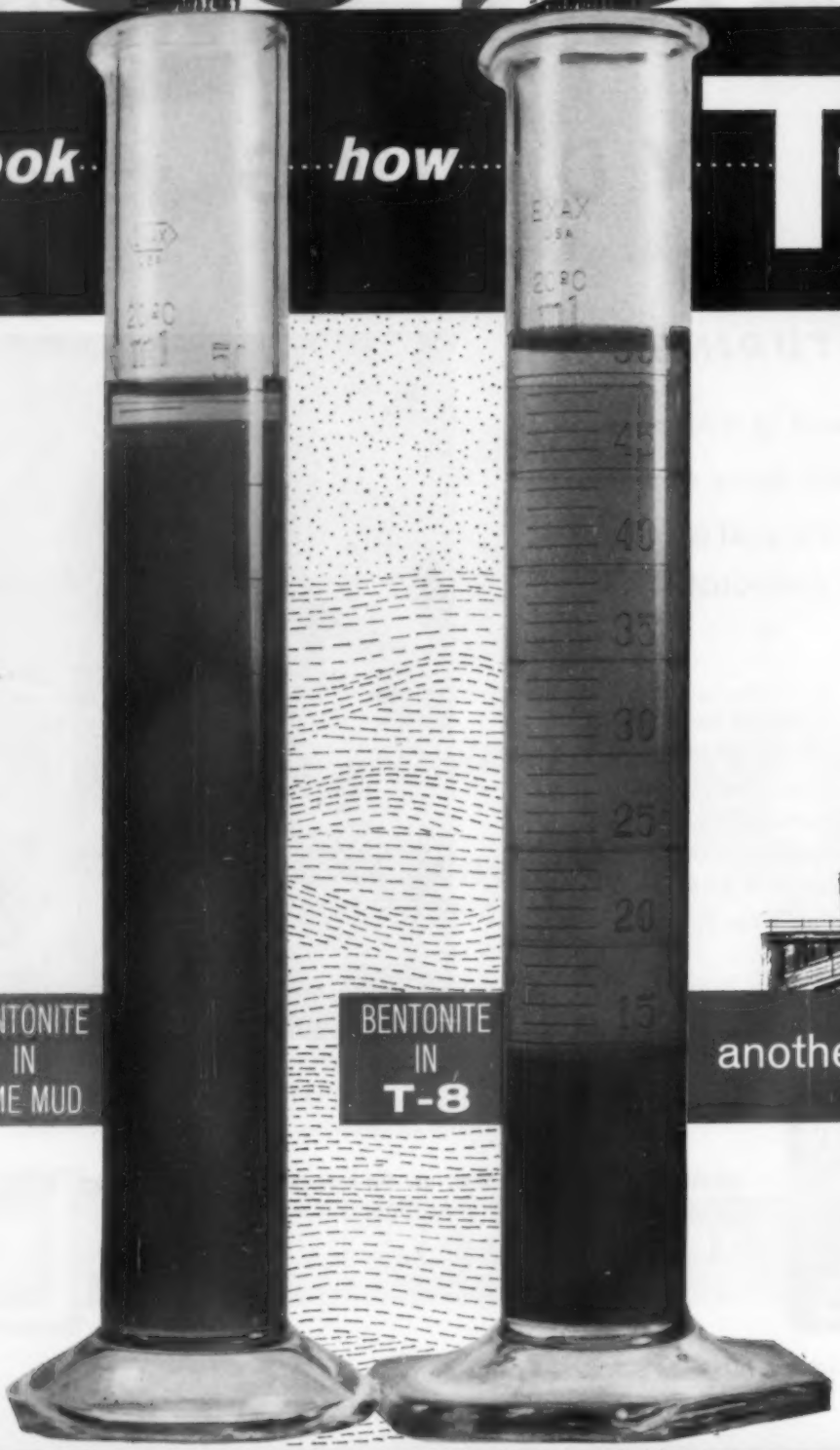
unmatched advantages of DARLING fully revolving double disc parallel seat gate valve principle!

There's new economy to be gained in the handling of "problem" fluids and gases with Darling aluminum alloy gate valves . . . now available in ½" through 24" sizes. We have data on initial and long-range costs and performance that will interest you. Write for facts.

DARLING VALVE & MANUFACTURING CO.
Williamsport 1, Pa.

well a,b well

Look how T-8



another *well done*

.....and Magcobar engineering cut mud cost on well

NEW ORLEANS AREA

	depth	type mud	weight mud	cost of mud
a	13,600 ft.	Lime	15.6 lb./gal.	$130,000
b	13,590 ft.	T-8	15.6 lb./gal.	$ 65,000

All along the Gulf Coast, savings have been substantial using T-8 instead of other muds in drilling shale formations. The secret of T-8, as the graduates to the left show, is that it reduces the hydration and dispersion of solids, minimizing the build-up of formation solids in the mud system.

With other muds, shale solids become part of the drilling fluid, increasing the viscosity. Water, added to reduce viscosity, lowers the mud weight, and new barite must be added. The additional barite and water increase the volume, so that expensive mud is jetted. With T-8 you can maintain good mud properties with less jetting, less barite, and at impressive savings.

The successful field performance of T-8 confirms Magcobar's basic approach to drilling fluid problems: Developing better products to solve specific drilling problems, and training better mud engineers to insure the highest level of performance from these products.

T-8 is only one of Magcobar's many answers to the problem of high drilling costs. The right products *used right* by Magcobar can cut costs on your next well, too.

Wherever your drilling operations, you can use Magcobar engineering and products. There are more than 500 stockpoints in the U.S. and Canada. Elsewhere, write Foreign Operations, P. O. Box 6504, Houston, Texas.

with Magcobar Technology

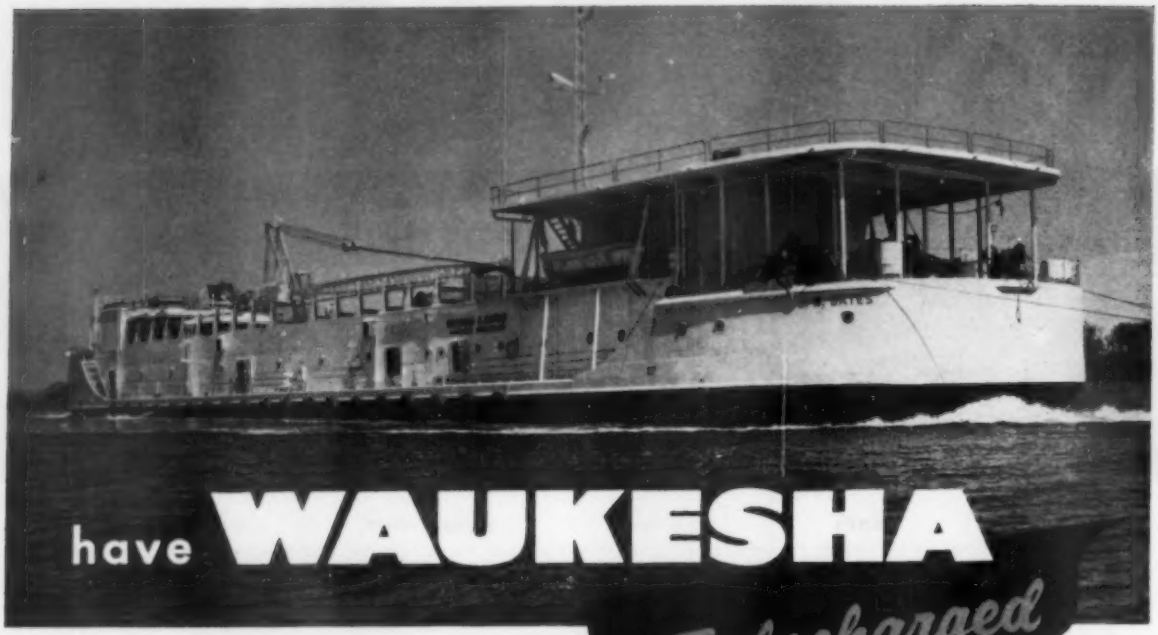
MAGNET COVE BARIUM CORPORATION

Houston

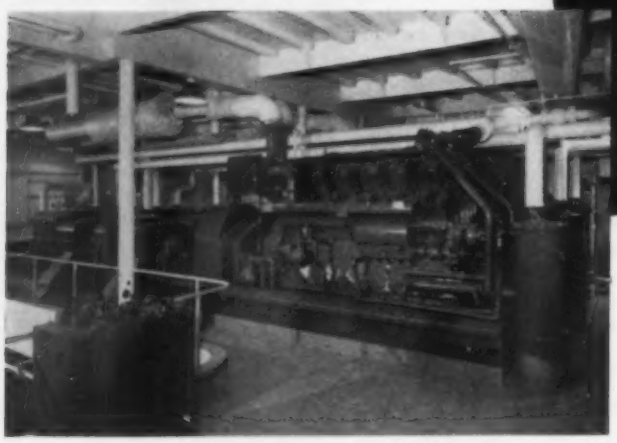
Magcobar
Complete
DRILLING MUD SERVICE

READING & BATES Offshore Drilling Company

OFFSHORE DRILLING TENDERS



have WAUKESHA *Turbocharged* DIESELS



(above) Drilling tender J. W. Bates uses (left) three WAUKESHA Model VLRDBS Turbo-Supercharged DIESELS—12-cylinder, 60-degree vee, four cycle, 8½ x 8½-inch bore and stroke, 5788 cu. in. displacement, with counterbalanced crankshafts. Send for Bulletin 1663.

Reading & Bates Offshore Drilling Co., of New Orleans and Tulsa, have two drilling tenders, the *J. W. Bates* and *George M. Reading*—260′ long; 54′ wide; molded depth, at sides, 16′3″. The tenders operate offshore, one in the Gulf of Mexico, the other in the Gulf of Persia, at a distance of 40-75 miles. Both use Waukesha V-12 Turbocharged Diesels.

Pictured above are the tender *J. W. Bates;* and its three VLRDBS Waukesha V-12 Turbocharged Diesels driving the National Supply Company's largest mud pumps (No. 2-G-1000) through a three-section National gyrol compound with two-speed drive.

An official of Reading & Bates says, "The Waukesha V-12 Turbocharged Diesels, through their dependability and economical operation have earned the confidence and approval not only of the drilling crew personnel but of the entire Reading & Bates organization."

416

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN / New York • Tulsa • Los Angeles
Factories: Waukesha, Wisconsin and Clinton, Iowa

See our exhibit at the International Petroleum Exposition, Tulsa, May 14-23, and 5th World Petroleum Congress, New York, June 1-5.

another
TRETOLITE SERVICE
report

SOLVO*
Paraffin Remover
prevents accumulation

DON'T LET PARAFFIN "SNAKES" CHOKE OFF YOUR PRODUCTION

The best and most economical paraffin control program is a continuous program of prevention.

The snake-like mass of paraffin shown was removed from a Kansas well and is a typical indication of what happens when paraffin is allowed to accumulate. When paraffin accumulates to this extent, it chokes the well and must be removed by scraping, steaming or the application of powerful, costly (and often hazardous) chemical cleaning methods.

*SOLVO *is a registered trademark of the Petrolite Corporation.*

DON'T CLEAN PARAFFIN OUT... KEEP IT OUT... WITH SOLVO!

It's much easier, and cheaper, to stop paraffin troubles before they require costly cleaning and scraping. Regular treatment with SOLVO does this. SOLVO Paraffin Remover contains no carbon bisulfide, no carbon tetrachloride. It is essentially chloride-free.

Stop paraffin trouble before it begins—with SOLVO. For the "how" story, ask the Man in the Red Car. Or write to . . .

PR-59-1

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PERU: International Gas Lift Company, Apartado 71, Talara
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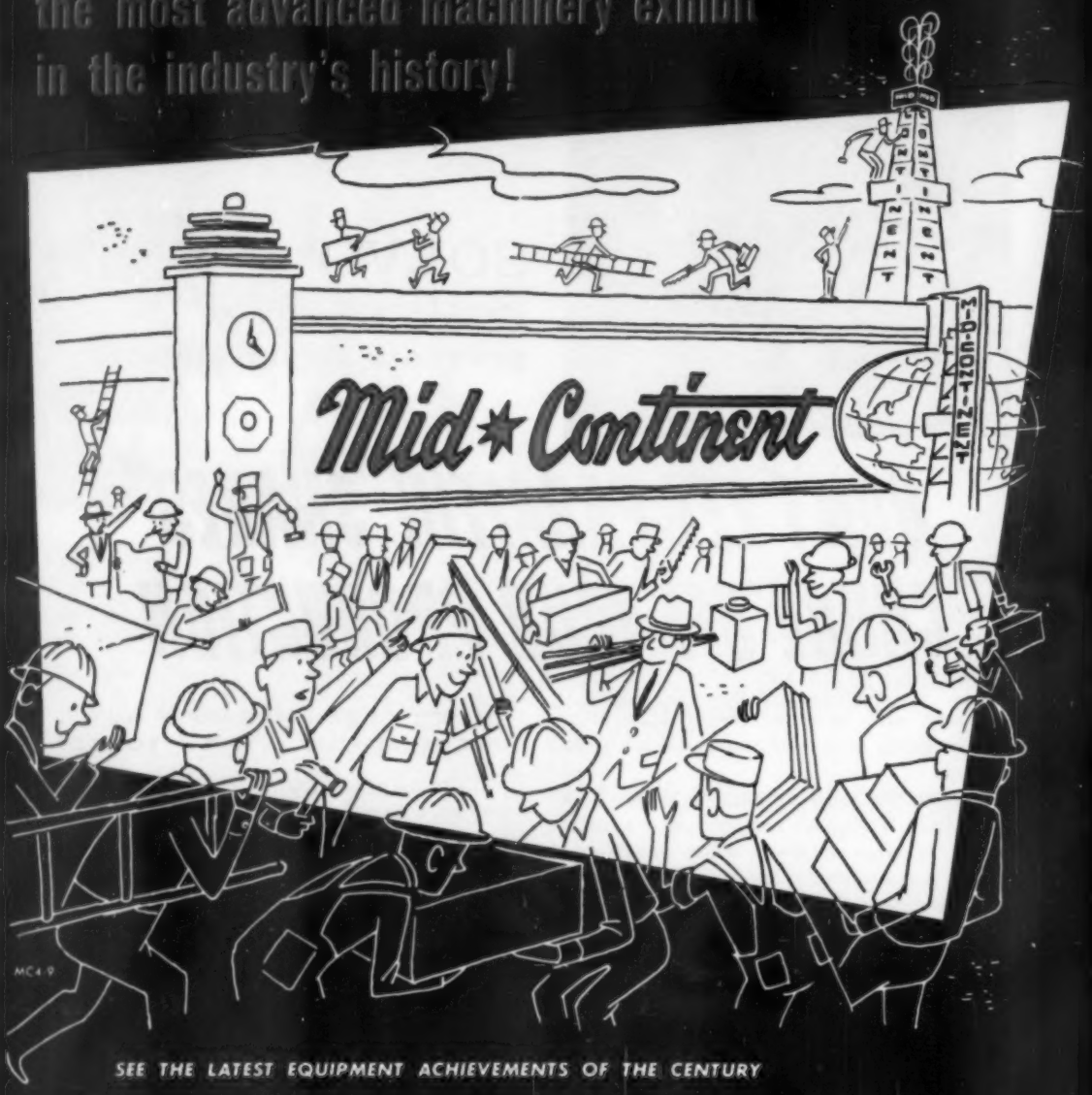
For oil's 100th birthday...

MID-CONTINENT is now working on the most advanced machinery exhibit in the industry's history!



SEE THE LATEST EQUIPMENT ACHIEVEMENTS OF THE CENTURY

INTERNATIONAL PETROLEUM EXPOSITION

TULSA - MAY 14-23

MID-CONTINENT SUPPLY CO.

MID-CONTINENT BUILDING • FORT WORTH, TEXAS
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THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

SNAKES, QUICKSAND AND RIGHT-OF-WAY CAUSE HEADACHES — BUT

Florida's First Gas Line Moves Ahead

Harbert Construction Corporation is under way on more than 1,000 miles of main and lateral gas pipeline in Florida. It's part of The Houston Corporation's 2,600-mile system stretching from McAllen, Texas, to Cutler, Florida — the longest pipeline project now under construction in the world. Two new Allis-Chalmers spreads are helping Harbert's crews maintain a fast pace to bring Florida its first natural gas.

Harbert Construction Corporation, Birmingham, Alabama, has 37 new Allis-Chalmers machines pushing pipe through snake-infested swamplands and along the new Sunshine State Parkway. Equipment includes HD-16 and HD-11 tractors with Tractomotive side booms and HD-16 and HD-11 dozer tractors.

(continued on next page)

Heavy line on map shows route of pipeline under contract to Harbert in Florida.

Note close proximity of expressway fence to right-of-way as two HD-16's lower-in the pipe. Another problem was water which seeped in as soon as trench was dug.

. . . move ahead with ALLIS-CHALMERS

Florida's First Gas Line Moves Ahead

18-inch Line Along the Toll Way

The spread laying 18-inch pipe from Ft. Pierce to Cutler, Florida, is working tight against the toll road right-of-way. Because of the expressway fence, dirt from the trench must be dumped on the working side of the right-of-way and dozed level. In spite of this obstacle, plus numerous water crossings and spongy ground conditions, Harbert's crew is completing about two miles of pipeline per day. Jay Cundiff, spread superintendent, is particularly impressed with the speed and maneuverability of the Allis-Chalmers tractors which are doing an outstanding job of handling pipe and hustling up and down the line. Operators speak highly of the tractors because "they're easier to handle and take less out of a guy" than other units.

Much of the line is being laid in mucky swampland, and the excellent clearance and flotation of the Allis-Chalmers tractors are major factors in holding to a fast time schedule. It is necessary to pump the ditch constantly to keep pipe from floating. Most of the small creeks were bridged, but in crossing the St. Lucie Canal, pipe was concrete-coated and sunk to the bottom, giving approximately 53 feet of clearance for ships. This pipe weighed 18,000 lb per joint and was handled by HD-11's with full counterweights.

John Harbert, president of Harbert Construction Corporation. The company's operations extend throughout the U. S. and into Latin America.

8-inch Line Through the Swamps

The spread working through swamp country is laying 8-inch lateral from Bradenton to Bartow where it will connect with the 20-inch main line. Harbert's men and machines must cross country roads, sink pipe beneath the beds of the Braden and Manatee Rivers, cross countless bayous and miles of quicksand and gooey swampland.

Crews are laying about three

Immediately after lowering-in, Allis-Chalmers HD-16 tractors with angledozers key-slotted the ditch to prevent pipe from floating.

. . . move ahead with **ALLIS-CHALMERS**

miles of pipe a day. Veteran spread boss, Jack Fraley, feels it's very good production, particularly in view of the terrain and right-of-way delays. He says, "The Allis-Chalmers tractors are doing a marvelous job helping us meet tight schedules. They have plenty of power, are terrific on the back ends, and the long track is made to order for the swamps we're hitting."

When the crews hit particularly soft muck, the tractors dozed brush and trees over the right-of-way to provide a road for pole line trucks. Speaking of the Allis-Chalmers tractors, Chuck Teall, Fraley's right-hand man, says, "Our operators say they're easy to handle, and they've got the power and clearance. They don't bog down, and if they hit a deep spot, they manage to pull out of it under their own power."

Safety-First, Harbert Motto

The entire Harbert organization is extremely safety-minded. The company has a radio-equipped safety car which patrols the work area. Workmen wear knee-high metal leg guards for protection against snakes. This same safety-conscious attitude was an important factor in Harbert's choice of Allis-Chalmers equipment. Features like drop-proof, safety counterweights, internal expanding boom brakes, and the proved torque converter drive all contribute to crew and operator safety.

You can find out why more and more pipeline contractors, like Harbert, prefer Allis-Chalmers — Tractomotive equipment for their big spreads. Ask your Allis-Chalmers dealer for the facts and figures — and a working demonstration, too. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin. Tractomotive Corporation, Deerfield, Illinois.

Two HD-16's move pipe into position. Water-filled trench is common condition along entire right-of-way. Sam White, maintenance superintendent, praised Allis-Chalmers Positive Seal truck wheels as the best in the business for working in mud and water.

Note metal leg guards worn by Harbert personnel as protection against snake bite.

Model FORTY FIVE motor grader levels right-of-way. The FORTY FIVE's ability to handle big windrows speeded cleanup — put the soggy right-of-way in excellent working shape in short order.

HD-11 tractor

- 40,200-lb maximum lifting capacity at 4-ft overhang
- 99 net engine hp
- 34,400 lb weight, including side boom equipment

HD-16 torque converter tractor

- 78,000-lb maximum lifting capacity at 4-ft overhang
- 150 net engine hp
- 59,010 lb weight, including side boom equipment

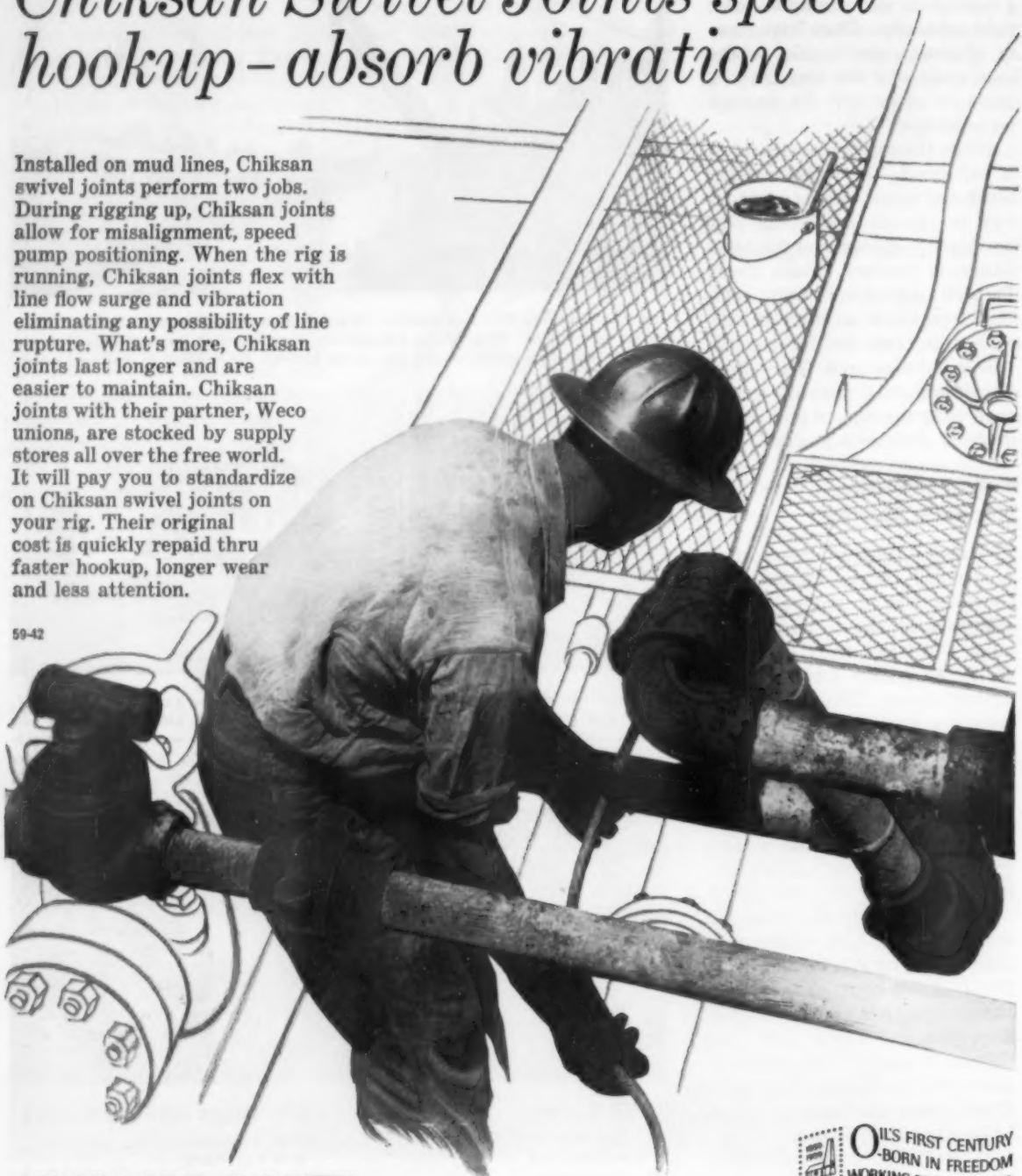
and TRACTOMOTIVE... power for a growing world

ON MUD LINES –

Chiksan Swivel Joints speed hookup – absorb vibration

Installed on mud lines, Chiksan swivel joints perform two jobs. During rigging up, Chiksan joints allow for misalignment, speed pump positioning. When the rig is running, Chiksan joints flex with line flow surge and vibration eliminating any possibility of line rupture. What's more, Chiksan joints last longer and are easier to maintain. Chiksan joints with their partner, Weco unions, are stocked by supply stores all over the free world. It will pay you to standardize on Chiksan swivel joints on your rig. Their original cost is quickly repaid thru faster hookup, longer wear and less attention.

59-42



OIL'S FIRST CENTURY
-BORN IN FREEDOM
WORKING FOR PROGRESS

CHIKSAN fmc

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HERE'S THE WAY TO CUT PRODUCTION COSTS

Specify CONTINENTAL-EMSCO

FOR ENGINEERED QUALITY

CUT SUBSURFACE PUMPING COSTS with C-E men who know your pumping problems

When you first put your wells on pump, make your C-E man a member of your *production team*. He knows the well conditions of the area he serves. He can deliver the *right* D+B pump to pump your well at high efficiency with low operating and repair costs from the 37 types and over 700 variations of D+B subsurface pumps . . many are designed for special gaseous, sandy, corrosive, and other problem well conditions. You're safe with D+B pumps.

Their high quality of design, materials and workmanship gives them the longest possible pumping life.

Backing up D+B pumps are D+B pump shops equipped with modern tools and manned with fully trained personnel to keep your wells producing.

CUT COSTS WITH ACCESSORIES IN HARMONY WITH THE COMPLETE PRODUCTION UNIT

GREEN TRIANGLE V-BELTS

Power transmission is vital to pumping efficiency. Here you need V-Belts identical in size, length, freshness and material to distribute the load equally. These advantages are yours with GREEN TRIANGLE V-BELTS.. *sold only in matched sets.* These field-proven belts are manufactured by New York Belting and Packing Company, America's foremost producers of oilfield rubber goods.

D+B QUICK-GRIP CLAMP

See how simple it is for one man to tighten this clamp. "Knuckle-busting" is completely eliminated.

CONTINENTAL-EMSCO API POLISHED RODS

Whatever your well condition, you can *top* your sucker rod string with one of five Continental polished rods and be assured of the highest quality in workmanship and materials with longer service life.

CUT SUCKER ROD COSTS with the CONTINENTAL-EMSCO TYPE 5 ROD

Here is a typical a
building *extra* quali
element VANADIUM
cases higher priced "
properties to provid

Similar research is
each designed for sp

Where economy is a
C-E man. His reco
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Continental
HI-TEN
Sucker Rod

Continental
RELIANCE
Sucker Rod

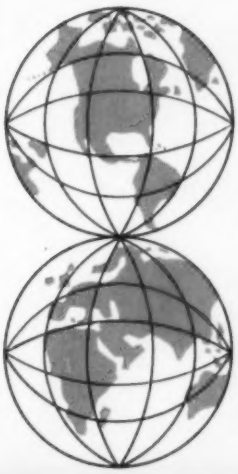
Continental
TYPE 5
Sucker Rod

Continental
API GRADE
Sucker Rod

application of modern metallurgy by C-E engineers in
ality into Continental sucker rods. Adding the amazing
UM, strengthens the Type 5 rod letting it replace in many
d "high-tensile" rods. Type 5 rods have the correct chemical
ide resistance to corrosion.

is reflected in the other three Continental sucker rods . .
specific well conditions.

a factor, it pays to talk Continental sucker rods with your
commendations will reduce your pumping costs (1) by
ditions with the *right* rod and (2) by giving you higher
service.



WORLDWIDE SERVICE

Continental-Emsco is matching your production needs throughout the Free World with stores, factories, and representatives in over 30 foreign countries.

CUT SURFACE EQUIPMENT OPERATING COSTS with a CONTINENTAL-EMSCO UNIT PUMPER MATCHED TO YOUR WELL

ENGINEERED NOT JUST BUILT

C-E unit pumpers are available in a range of sizes to wells of all volumes and depths. You can pinpoint needs for each well and eliminate the waste of runn underloaded unit or the expense of running an over unit. Flexibility in counterweight positions assures accurate counterbalancing for lower electric or fue .. less wear of gears, belts, bearings and well equi Counterbalancing is an easy, one-man job at th ground-level position.

Pitman design and use of roller bearings lower st loads by reducing breakaway friction .. a big design f for keeping power cost low when using electric m

T LIFTING COSTS with the complete
TINENTAL-EMSCO PRODUCTION PACKAGE

s to pump
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fuel costs
quipment.
the safe

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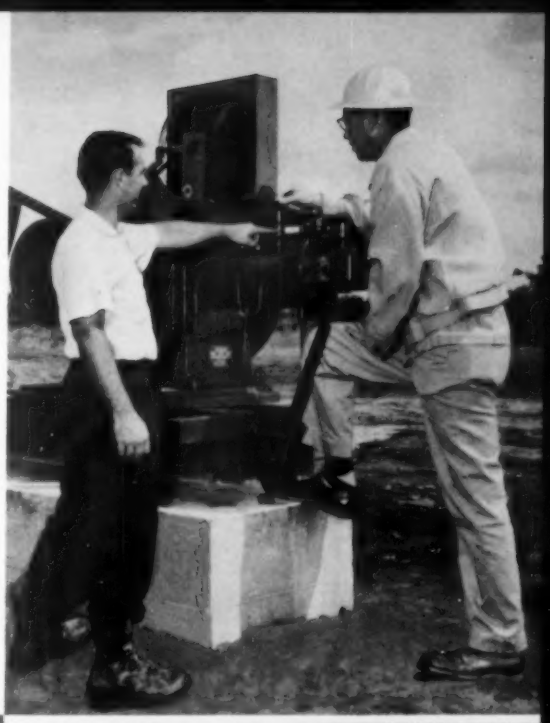
c motors.

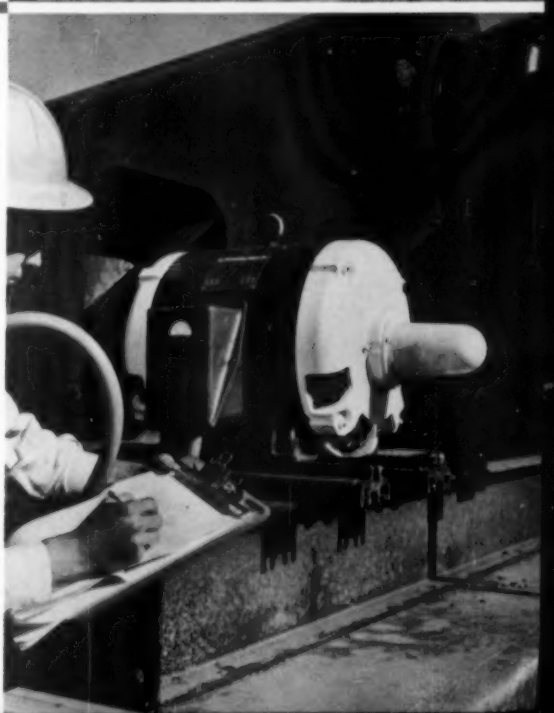
CONTINENTAL-EMSCO ENGINES

These engines greatly reduce pumper's servicing time due to engine's easy-to-start, easy-to-adjust and easy-to-maintain features. C-E engines maintain production schedules in all types of climatic conditions. Simple design, easy accessibility of working parts and unit assemblies cut repair time which reduces costly downtime.



C-E GREEN TRIANGLE ELECTRIC MOTORS

Designed *exclusively* for rugged oil field pumping, these motors provide steady, sure, economical power. They have 5-8% slip . . 275% starting torque . . 40° C rise with a *guaranteed* 1.15 service factor. A built-in balance meter makes it possible to accurately balance your well. And by glancing at the meter, field personnel can detect subsurface trouble.



Quick Service from Local D+B Pump Shops

Continental-Emsco Store at Maracaibo, Venezuela

CONTINENTAL-EMSCO IS THE FOCAL POINT FOR SALES AND SERVICE IN PRODUCING AREAS THROUGHOUT THE WORLD

Wherever you pump oil in the U.S.A., Canada, South America or remote producing fields of the world, you'll find that Continental-Emsco stores or representatives have preceded you there. This means a world-wide supply of proven production equipment, experienced personnel to help in equipment application, and a dependable source of repair and replacement parts. So, remember when you go *worldwide . . go Continental-Emsco.*

For Service that Sings . . Equipment that Hums . . Go

CONTINENTAL-EMSCO

Serving the Oil and Gas Industries ... Worldwide

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Research is where you find it . . .

. . . *if it's needed, it's right!*

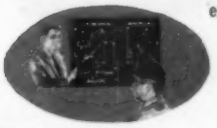
From many sources throughout the great petroleum industry have sprung ideas of unusual significance. Exhaustive investigation and practical scientific development have brought them to fruition, leading to better or more economical ways of producing gasoline and other petroleum products.

In this atmosphere of free and unfettered research, Universal Oil Products Company fills an important role. An independent professional research, design and engineering organization, UOP develops processes, makes certain they are commercially applicable and then makes them available to all refiners everywhere in the free world.

Although itself a pioneer in the origination, development and engineering of many important processes, UOP pursues the policy of bringing to the petroleum and petrochemical industries the benefits of any new research in which it has had a part. Occasionally, others bring a research item to Universal where it is further developed and made commercially practical for use throughout the industry.

For the progressive refiner, any new process that may improve his economic position is worth looking into—regardless of where the basic idea originated.

engineering • design



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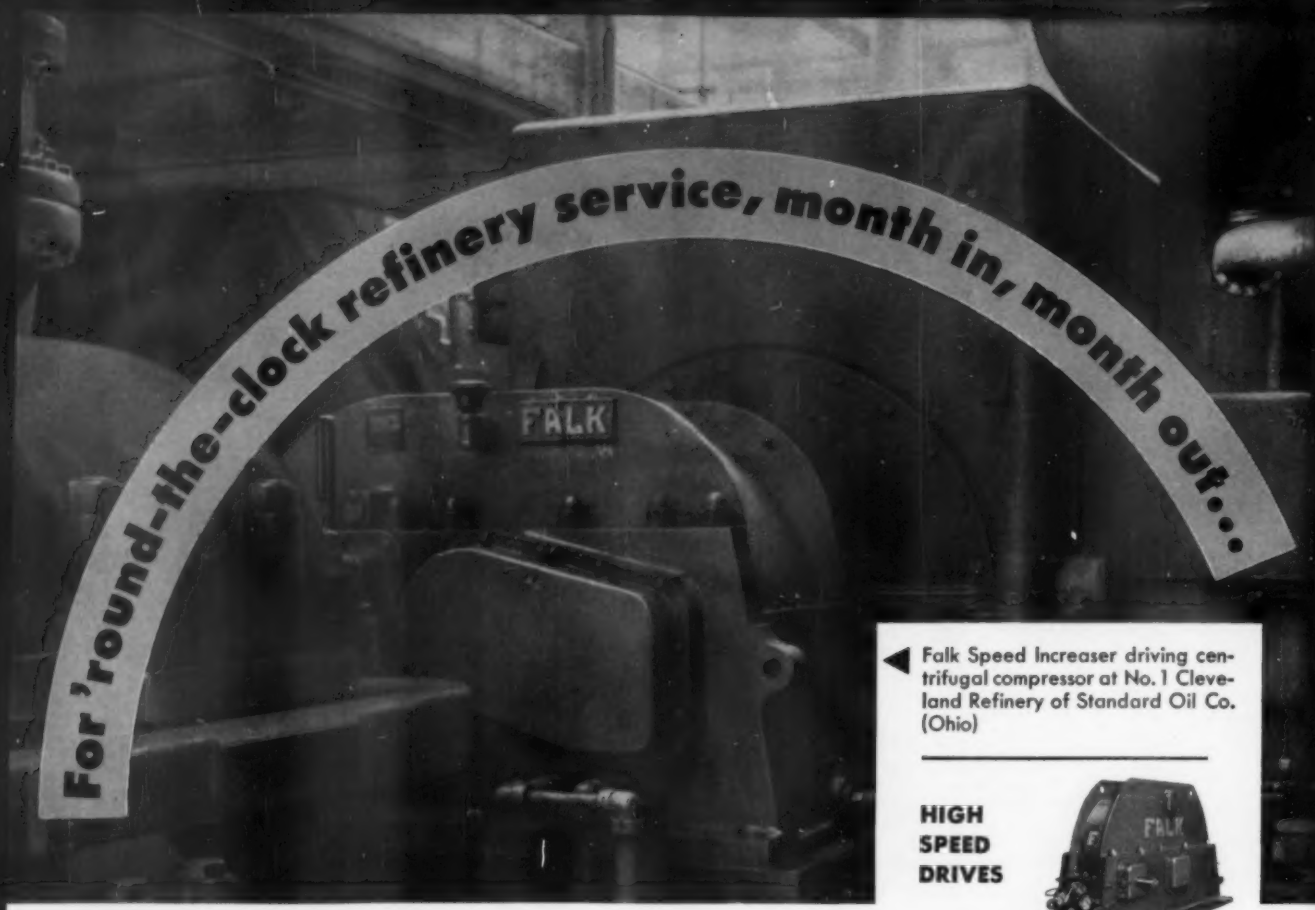
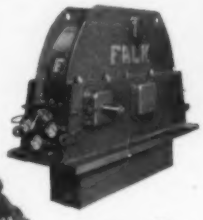
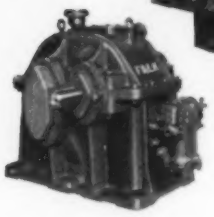


◀ Falk Speed Increaser driving centrifugal compressor at No. 1 Cleveland Refinery of Standard Oil Co. (Ohio)

HIGH SPEED DRIVES

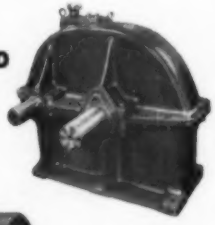




type **P**

type **Q**

SEMI HIGH SPEED DRIVES



type **H**

type **S**

FALK offers a complete line of standard high speed and semi-high speed drives

type P Ratios—from 2.5:1 to 12.0:1.
Horsepower—up to 2000 hp per 1000 rpm of high speed shaft.
Maximum speed of high speed shaft: 10,000 rpm.

type Q Ratios—from 1.15:1 to 9.5:1.
Horsepower—up to 1800 hp per 1000 rpm of high speed shaft.
Maximum speed of high speed shaft: 10,000 rpm.

type H Ratios—from 2.22:1 to 9.89:1.
Horsepower: up to 1100 hp.
Maximum speed of high speed shaft: up to 3600 rpm.

type S Ratios—from 1.49:1 to 25.4:1.
Horsepower—up to 224 hp.
Maximum speed of high speed shaft: 4500 rpm.

SPECIAL DRIVES...to any required speed and horsepower.

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Designed and produced by the Falk engineers who pioneered the ultra-high speed gear units for aviation turbo engine test facilities, Falk standard high speed drives are widely used in refineries throughout the country. Our technicians will be glad to work with your engineers or with your equipment suppliers to select and produce drives precisely suited to your operation.

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FALK

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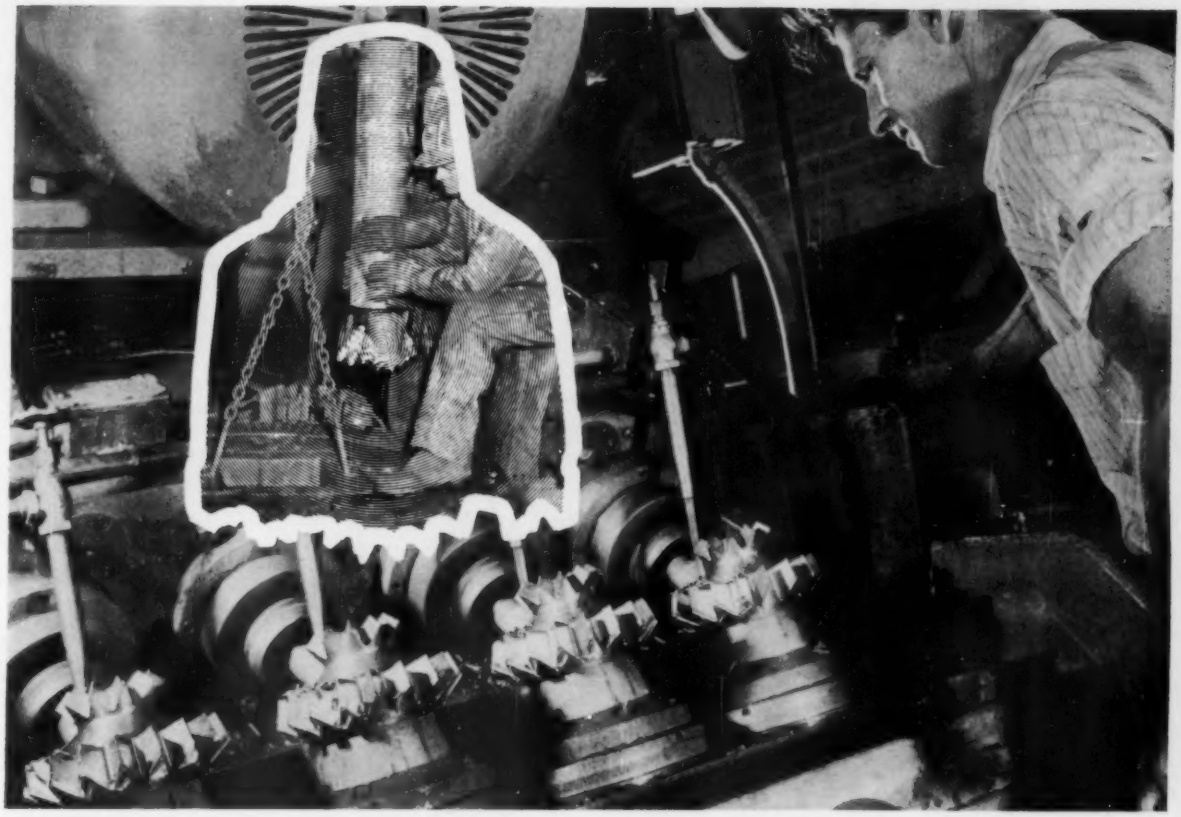

All Security Bit Penetration Records Start Here!

Here's why, on hundreds of new wells every month, Security bits are the first choice for fast, dependable drilling. Security rock bits are machined right, to rigid specifications and exacting tolerances. Batteries of machines, like the one illustrated, mill bit cones to precise cutting angles. Scores of other machines shape bit arms, bearings, and other bit components to provide outstanding service under the most difficult field conditions.

Security has acres of modern production equipment with the capacity to manufacture thousands of bits faster than ever before. *But more important,* Security bit production adheres to quality standards unsurpassed in the industry. These high standards have enabled Security bits to score penetration records on some of the world's deepest and most difficult wells.

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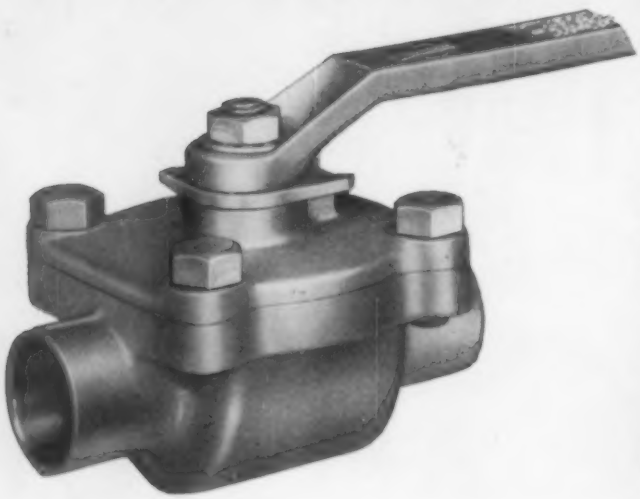

The Rockwood Top Entry Ball Valve

Here's the advanced-design ball valve that's practically as easy to service as it is to operate. Ideal for oil, gas, oxygen, or hazardous liquids, it's a real time and money saver. Check the specifications below, then mail coupon for complete details.

Specifications: Cast Bronze; Buna N Seals; Forged Hard Chrome Plated Ball; Beryllium Copper Spring; Buna N Seats (also available in Teflon, nylon, and Viton-A); Sweat or Thread Ends; Sizes: ½″, ¾″, 1″, 2″; 300 p.s.i. — W.O.G.

ROCKWOOD BALL VALVES

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Direction of shut-off can be changed merely by reversing cage assembly. After removal of four screws, the body cap lifts right off, permitting access to the internal parts of the valve without removal from the line.

Changing Type of Seat: Cage assembly removes easily without special tools. Seat, seat retainer, spring, retainer, and ball removed as one unit for service or replacement.

Cleaning: Simple design and construction of body permits valve to be completely cleaned quickly and easily.

8 Ways Easier to Handle During Installation and Operation, Too — because square stem design permits on-off operation in any of 8 positions. Rugged stem keys directly into floating ball.

Heavy hauling made easy! Up front is a Mack-mounted cementing rig in action. Behind it is the world's largest mobile rig, operating in Venezuela and completely Mack-drawn.

Whatever the oil-field hauling job—rigs, draw works, casing, boilers, power units . . . . Macks have the guts and go to get there first . . . . with the most . . . . and at lowest costs.

How hard do you think about cutting hauling costs?

Ever figure the added returns that a really strong, long-lived truck can give you? A truck that truly measures up to the non-stop abuse of oil-field terrain . . . and goes on working year after year with only routine servicing? There *is* such a truck—and Mack's the name. For over fifty years Macks have been famous—in every hauling field—for their extended earning life.

What's behind the extra stamina . . . the longer life of Macks? Mack frames, axles and suspensions—the most rugged in the business. Mack-built transmissions—with exclusive gear design and use of the finest metals obtainable. Mack Thermodyne® diesel or gasoline engines—units that have been known to run 400,000 miles . . . 500,000 miles . . . and even further without a major overhaul. Mack Balanced Bogies—tandem rear axles with matchless traction over terrain conditions that mire in other makes.

Let your Mack branch or distributor help you figure out how much Macks can save you over the next five years. Ask them to show you how Mack can custom-assemble the units that are *right*—in capacity, basic strength and long life—for your operation. And be sure to ask for the names of other Mack users as well. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

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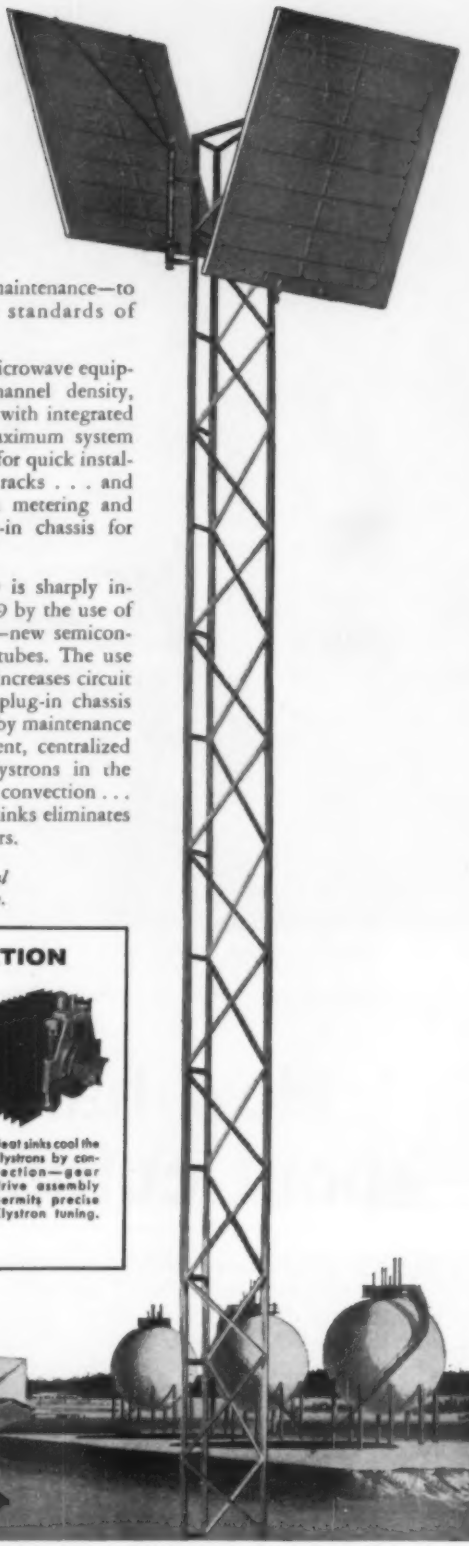
FIRST NAME FOR
TRUCKS

Reliable, unattended microwave operation for pipeline communications and control!



PLUS PHILCO'S TURNKEY SERVICES

Philco CLR-9 microwave delivers outstanding system reliability, economy of installation and operation, simplified equipment maintenance for dependable pipeline communications. With 240 voice channel baseband capacity—for telephone, telemetering and remote control—and capability for handling high-speed computer data transmission—Philco microwave fills both immediate and long-range requirements of modern pipeliners.

Philco's complete turnkey service includes—*site surveys* by competent survey engineers experienced in field techniques; *system planning* by Philco's systems engineers who design your complete communications system; *installation* of your microwave system by Philco field engineers—including erection of towers and shelters; and, Philco field engineers are available for *field service*—periodic inspection and preventive maintenance—to maintain the highest standards of system performance.

Philco's new CLR-9 microwave equipment provides high channel density, duplex communications with integrated standby facilities for maximum system reliability. It is designed for quick installation in standard relay racks . . . and engineered with built-in metering and test facilities plus plug-in chassis for easy field maintenance.

Performance reliability is sharply increased in the new CLR-9 by the use of tubeless power supplies—new semiconductor rectifiers replace tubes. The use of printed wiring panels increases circuit stability—and complete plug-in chassis may be quickly removed by maintenance personnel (permits efficient, centralized depot maintenance). Klystrons in the new CLR-9 are cooled by convection . . . the use of compact heat sinks eliminates the need for bulky blowers.

At Philco, opportunities are unlimited in electronic and mechanical research and engineering • Look ahead . . . and you'll choose Philco.

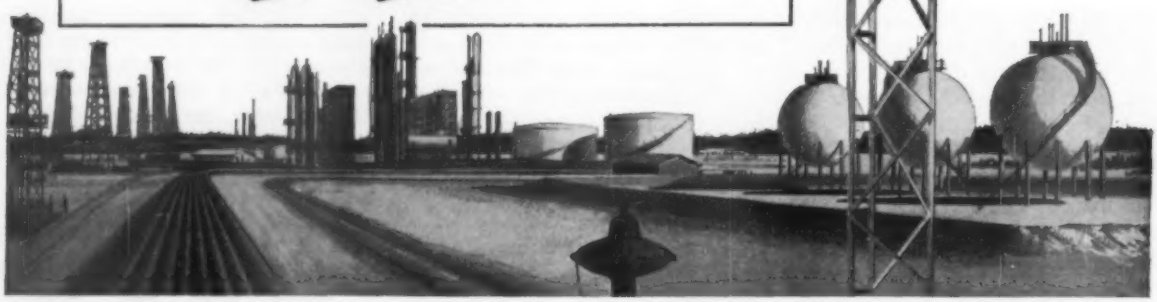
NEW PHILCO CLR-9 MICROWAVE STATION

The CLR-9 terminal consists of wave-guide assemblies, master control, tubeless power supplies and plug-in chassis for IF assembly, baseband drop, modulator, reflector control and servo.

Rugged printed wiring panels increase circuit stability and simplify maintenance.

Heavy-duty, tubeless power supplies increase reliability by employing semiconductor rectifiers—assures maximum reliability and minimum maintenance.

Heat sinks cool the Klystrons by convection—gear drive assembly permits precise Klystron tuning.



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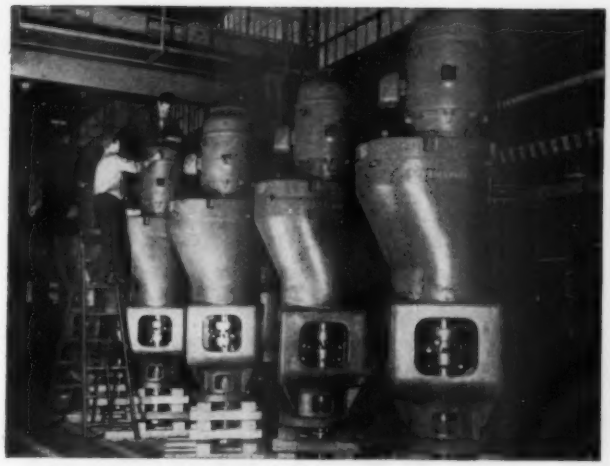
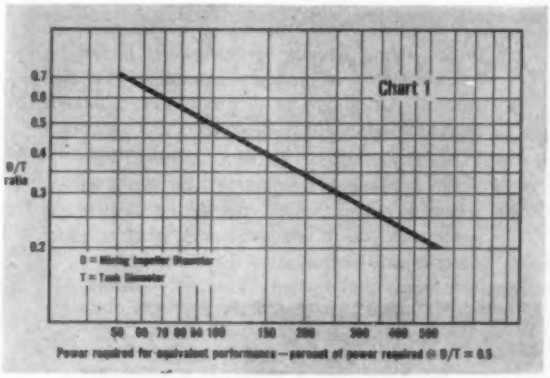


Q. In larger mixing operations, what are the economics of buying mixers that match requirements *exactly* compared to buying mixers having an adequate margin of torque capacity?

A. As mixing operations are scaled up and fluid mixers required increase in size, the cost per unit drive torque capacity decreases rapidly with the increase in drive size. It becomes poor economy not to maintain an adequate level of torque applied to the mixing operation. Consider also that agitators and auxiliaries rarely represent more than a small percentage (2-4%) of the plant investment . . . yet maintenance costs on the more difficult operations can run as high as 15% or 20%. If down time is considered, then costs can run many times these figures. Obviously, there is no economy in drives and components such as shafts which *just* meet requirements.

it's questions like these... that bring out the facts in buying mixers...



Q. Are "dollars per horsepower" a valid basis for comparing mixer values?

A. No. Mixers having the same horsepower rating and drive efficiency can vary widely in torque rating. Torque applied to the mix is what does the work and torque is what you pay for. When comparing mixer values, the most important first step is that of developing torque ratings of alternate units offered. Using the most familiar units, torque can be calculated as follows:

$$\text{Torque (lb. inches)} = \frac{63025 \times \text{Motor HP}}{\text{Mixer shaft RPM}}$$

The mixer having the lower torque rating must use a higher mixer shaft speed and smaller diameter impeller to maintain a given HP level. This can lead to unsatisfactory performance. However, a mixer of equivalent horsepower rating but with a higher torque rating and larger impeller will do the job well. For an idea of the importance of impeller size, the chart shows the influence of impeller diameter in relation to tank diameter (D/T ratio) upon motor required to obtain a specific level of performance in many industrial mixing operations. The bigger impeller at the slower speed (higher applied torque) will be a sounder choice.

YOU GET MORE FOR YOUR FLUID MIXER DOLLAR
Because We Design and Build The *Whole* Unit

It's simple economics! Philadelphia Mixer is the only manufacturer that designs and builds the complete unit. Because we control production and costs, we can afford to give you more mixer per dollar. For example:

- Extra large, heavy duty bearings throughout.
- Extremely heavy output shafting—machined, ground and polished.
- Drives designed with extra strength and rigidity to take maximum thrust and unbalanced loads.

You don't pay a premium for these extras—or for the better performance and longer life of a Philadelphia Mixer. You get them as a bonus.

You can select your Philadelphia Mixer from six standard models. 1 to 200 HP. Special units to 500 HP. Horizontal motor or vertical motor drive. Mechanical seal or packed stuffing box. Paddle or turbine type impellers.

Get the full story on Philadelphia Mixers. Write for Catalog A-27. It contains complete mechanical design information that permits you to make a catalog selection of the mixer that best suits your requirements.

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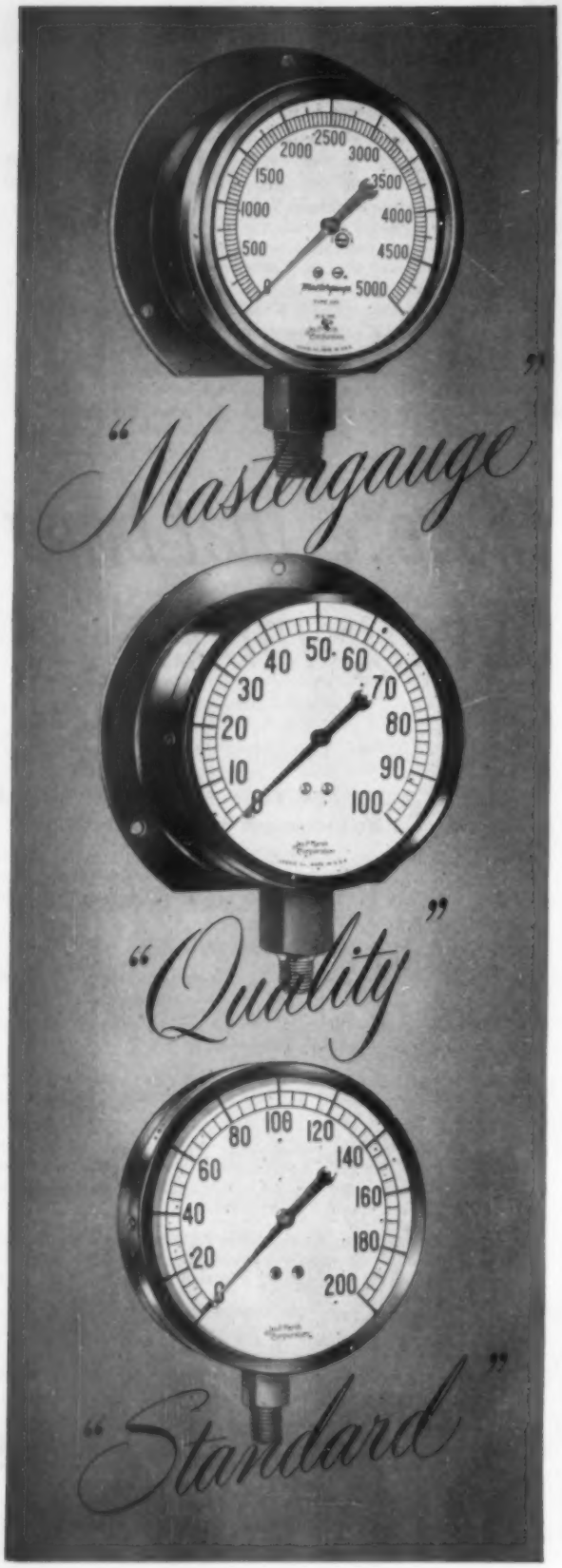

What pressure gauge for your particular need?

The clear-cut economical answer to your specific gauge problem is right here in the Marsh line. It is here because the Marsh line contains the world's most complete range of gauges in the three broad brackets of gauge applications.

THE "MASTERGAUGE" GROUP...for those extreme services that demand the ultimate in gauge precision, accuracy and stamina.

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While these three brackets run a wide gamut of prices, the difference between them is not so much a matter of *grade* as a matter of *kind* and *purpose*. All gauges in all groups reflect Marsh precision and quality. Collectively they cover practically every conceivable gauge requirement.

The answer is in the catalog...but if you have a special problem let our engineering department work with you to select the most efficient, most economical solution to your problem.

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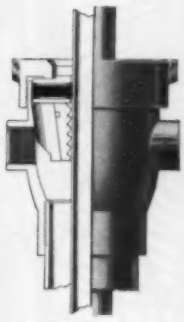
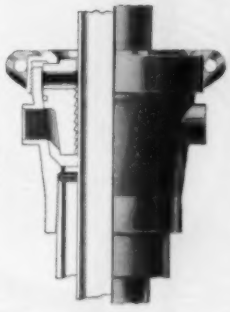
Casing and Tubing Heads

Rector Type "R" Casing Head

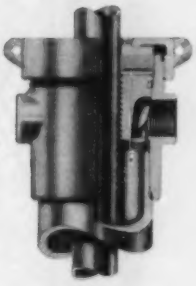


Rector Type "E" Tubing Head

Rated at 1000 Lbs. Working Pressure
2000 Lbs. Test Pressure



Rector Type "RT" Casing Head



Rector Type "R" Tubing Head

Rated at 2000 Lbs. Working Pressure
4000 Lbs. Test Pressure

Check these important features

SUSPENSION—Casing heads have case-hardened three-segment type *hinged* slips of ribbed construction to allow full flow to outlets. Tubing heads use same type of suspension or special threaded type or slip-type mandrel hanger for use with Kobe pump or dual string tubing installations.

SEAL—Both casing and tubing heads have an oil-resistant pack-off which is forced into sealing position by a split packing gland. Type "R" casing head gland is tightened by six stud bolts . . . Type "RT" casing head and tubing heads by a cap threaded to the body.

SIDE OUTLETS—Both casing and tubing heads are available with 2", 2½" or 3" threaded side outlets. Type "E" has 2" threaded side outlets only.

BOTTOM CONNECTIONS—Rector gives you a wide range of sizes. Casing heads have male or female threaded bottom connection. Type "R" is available through 13⅜", Type "RT" through 10¾". Type "R" tubing heads are available with male or female threaded bottom, 4½" through 7", also all flange sizes and series with standard API ring groove and bolting arrangement. Type "E" is available with female threaded bottom connection only.

Rector casing and tubing heads offer you the best value in Non-Flanged well head equipment. They are ideally suited for the widest possible range of producing conditions. Constructed of Alloy steel, they give long service at an amazingly low price.

Rector casing and tubing heads are available through your favorite supply store.
Or see your Rector representative.

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HOUSTON PLANT: 2215 COMMERCE STREET

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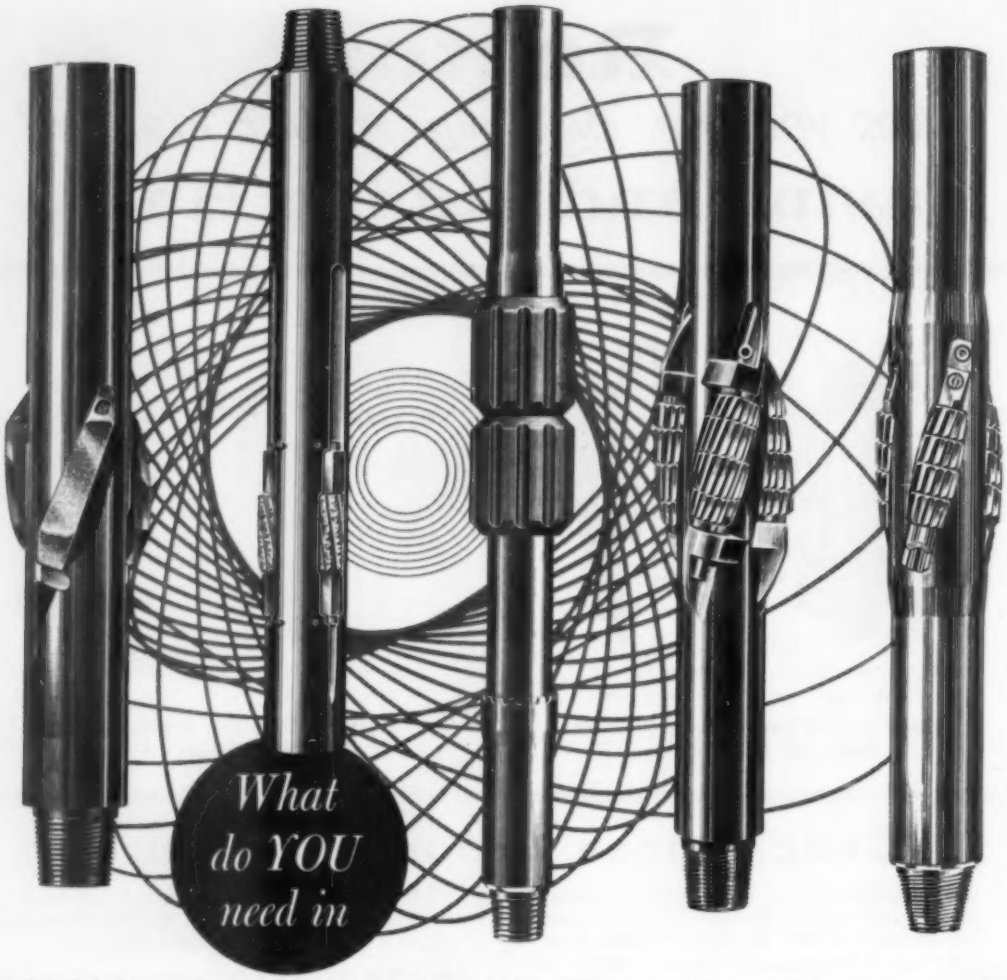

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There are not just one or two—but *five*—distinct types of Grant Drill String Stabilizers to meet every drilling requirement... every well condition... and every operator preference.

For reaming *and* stabilizing—Grant has perfected the Model 1530, Model 6480-A and Model 2020 Reamers for use in the drill collar string for maximum stabilization and round, full gauge hole.

For stabilizing *only*—Grant provides the Cushion Stabilizer and the Drilblade. Each assures proper drill string stabilization for faster penetration without increased weight on the bit.

Whatever your stabilizing requirements, just remember that, when it comes to stabilizing tools, **only** *Grant makes them all!*

This is just one of the three *families* of Grant Tools made for reaming, hole enlarging and stabilizing. For full information on these, and a wide range of other down-hole and surface tools made by Grant, send for your copy of the complete Grant Catalog *today!*

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Du Pont reports on a new synthetic rubber

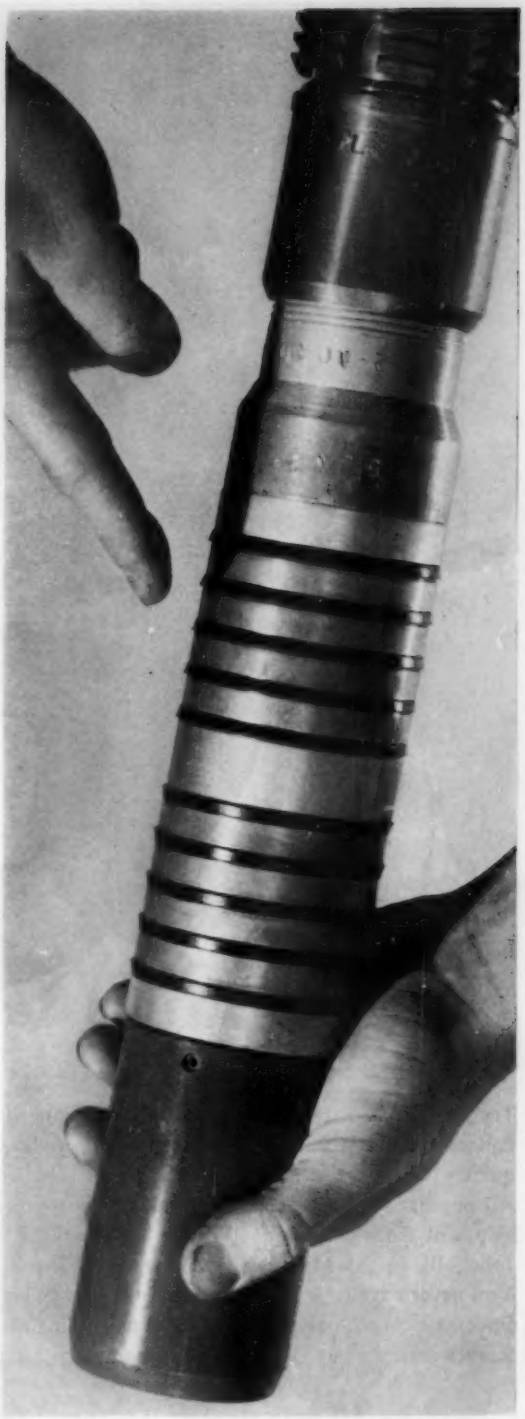
VITON seal rings unharmed by 6000 psi, 300° F. crude oil in deep hole packer

One of the first oil field reports on VITON, Du Pont's new high-temperature synthetic rubber, comes from a leading equipment manufacturer in Dallas, Texas.

Ten chevron-type rings, compression molded of VITON, are now being specified for the seal nipple assemblies on a line of drillable production packers made by this manufacturer. Reason: the VITON rings withstood 72-hour test runs of the assembly at 6000 psi and 300° F. without failure. (Pressure reversed each 18 hours.) Rings made of a well-known oil-resistant rubber, once standard equipment on the nipple, failed this same test. With VITON, this packer now offers a tight, contamination-proof seal between production zones . . . regardless of operating depth.

VITON synthetic rubber brings the oil industry a new material that will perform at temperatures as high as 450° F. in continuous service . . . 600° F. in intermittent service. Parts made of VITON resist an extremely wide range of oils, solvents and corrosive chemicals. They have excellent mechanical properties, such as low compression set and good tensile strength . . . plus resistance to ozone, oxygen and weathering.

Du Pont supplies VITON to manufacturers of rubber parts of all types. Ask your rubber goods supplier about gaskets, O-rings, seals, coated fabrics, hose and molded parts made of VITON. For more information on properties and uses, write to E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept. (OG-2), Wilmington 98, Del.



Ten VITON seal rings on this assembly establish a leak-proof seal between tubing string and the smooth bore of a drillable production packer. Continuous deep-hole operation for 72 hours at 6000 psi and 300° F. failed to harm the VITON rings or decrease their sealing efficiency.

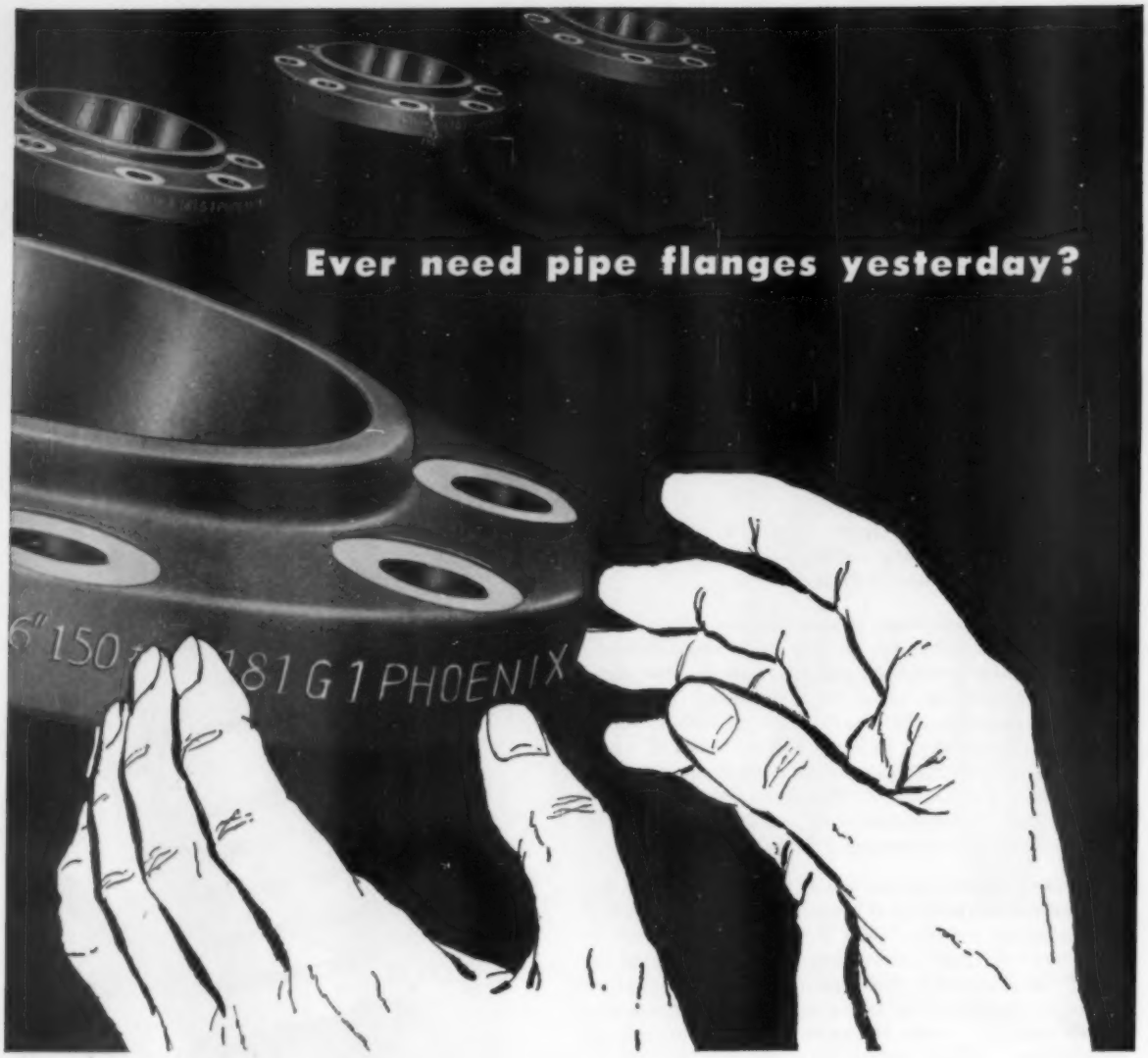
DU PONT
REG. U. S. PAT. OFF.

SYNTHETIC RUBBER

NEOPRENE
HYPALON®
VITON*
ADIPRENE®

Better Things for Better Living . . . *through Chemistry*

** Trademark for Du Pont Synthetic Rubber*



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Write for free 36-page pocket-size booklet containing useful data on flanges. It is one of the handiest booklets available for quick, easy reference.

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DIVISION—UNION TANK CAR COMPANY

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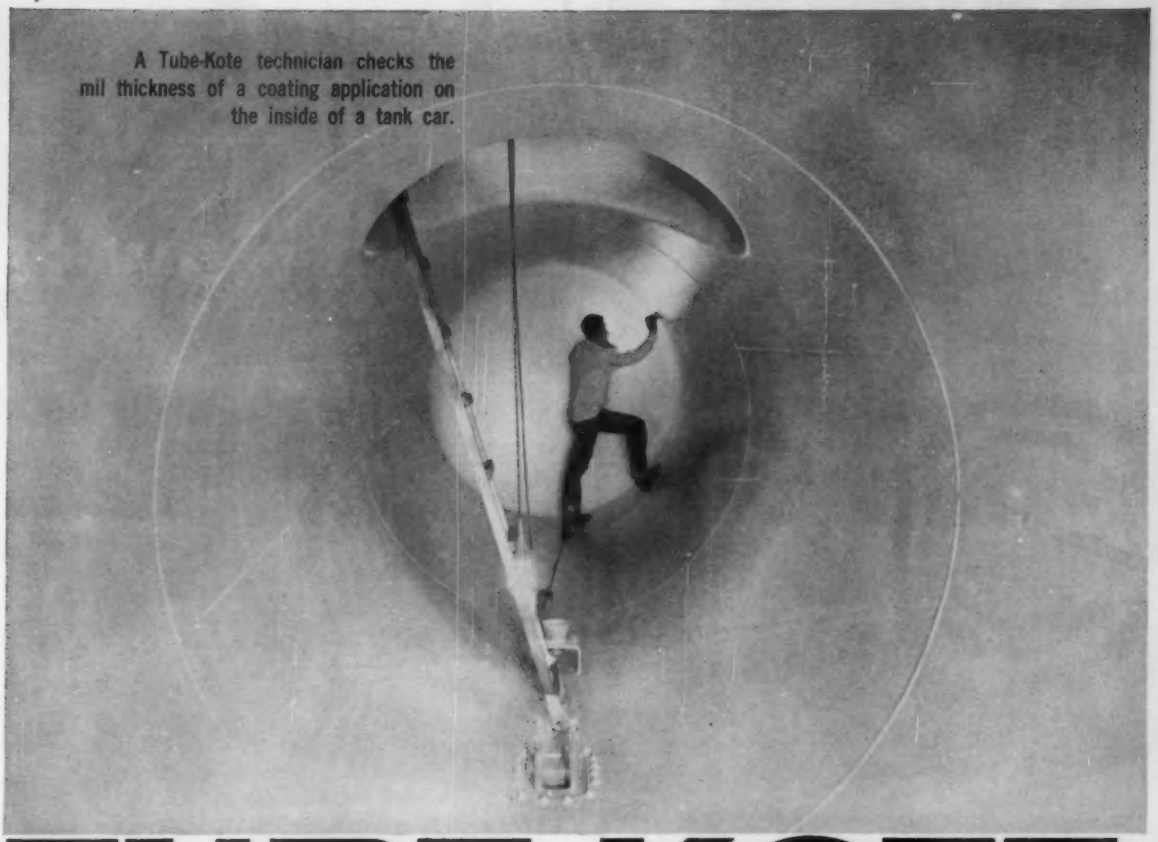
PHOENIX DIVISIONS: FLANGE AND FORGING DIVISION, STEEL MILL DIVISION, HORSESHOE PRODUCTS DIVISION, FABRICATING REBAR DIVISION



A Tube-Kote technician checks the mil thickness of a coating application on the inside of a tank car.

TUBE-KOTE®

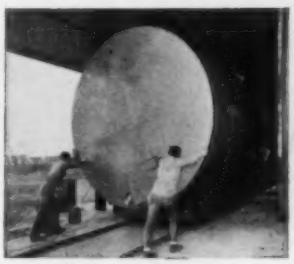
Applies corrosion resistant plastic coatings

. . . ANYWHERE!

This application of coating to the inside of a tank car destined to haul highly corrosive caustic liquids is typical of the many specialized problems successfully handled by Tube-Kote. Tube-Kote research has produced many new coatings . . . each with special properties needed to solve unique corrosion problems for the following industries:

- **Chemical**
- **Petrochemical**
- **Refining**
- **Beverage**
- **Electronic**
- **Food Processing**
- **Oil Field**
- **Plastic**
- **Textile**
- **Transportation**

Tube-Kote field crews will bring portable application and curing equipment to your plant or job site if your particular needs demand it.



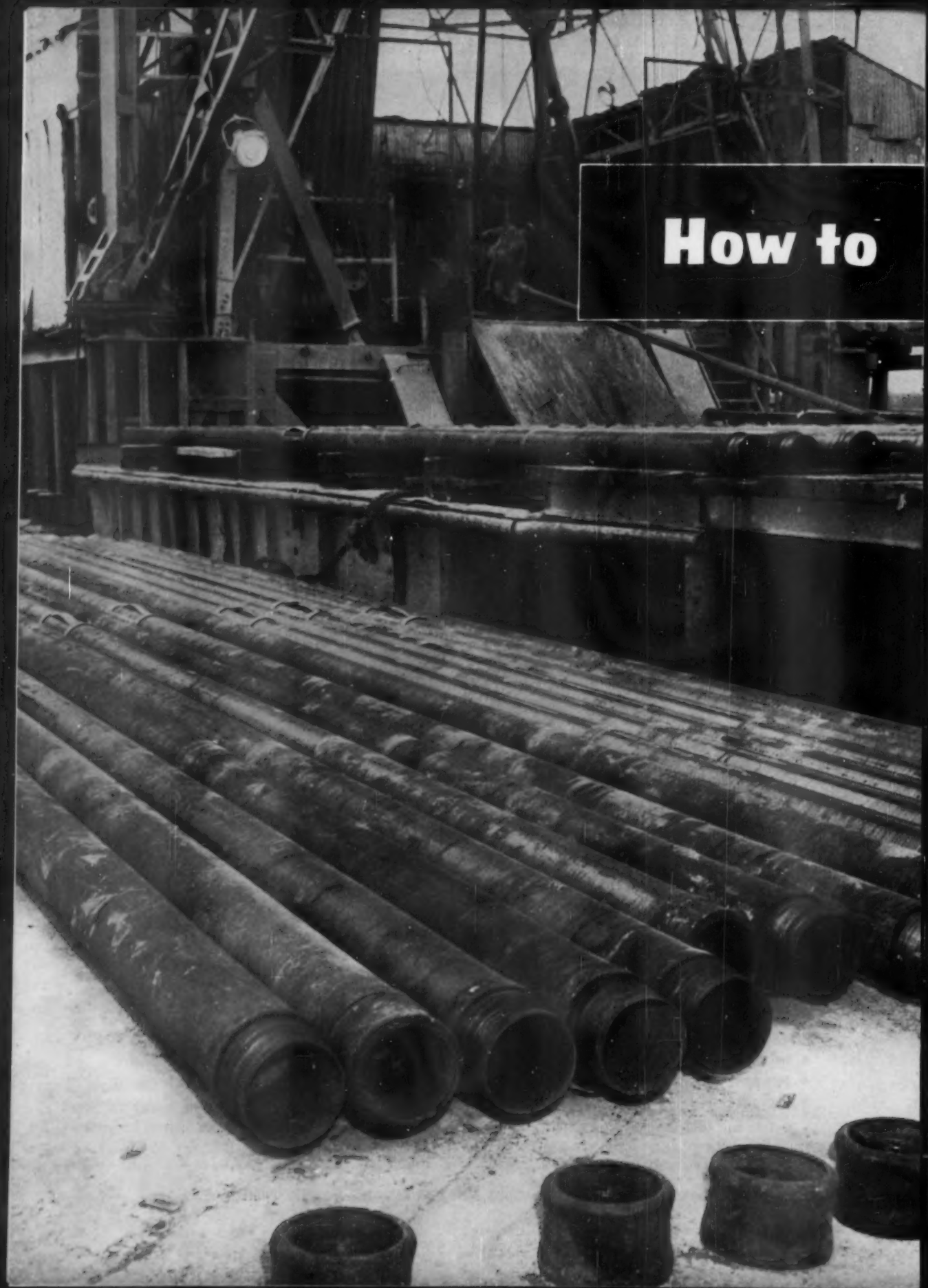
If you have a specialized coating problem, call on the experience and ability of Tube-Kote Industrial Sales Division to provide a coating for your particular needs.

TUBE-KOTE

Service Mark Reg. U. S. Pat. Off.

P. O. Box 20037 • Houston 25, Texas
Branch Plant: Harvey, Louisiana

OUR 20TH YEAR . . . THE INDUSTRY PIONEER


How to

Case With Confidence

J&L Extreme Line Casing lets you case your deeper wells with confidence. Extreme Line is the one casing designed for use under the most severe and variable conditions.

Extreme Line features include high joint strength, positive resistance to leakage, reduced outside diameter and elimination of couplings. Faster running speeds result from modern thread and joint design. External streamlining and high resistance to thread damage add to the qualities of this proven product.

J&L Extreme Line is available in grades J-55, N-80 and P-110. Quality controlled manufacturing of all J&L tubular products is your assurance of superior performance.

Be sure you have the latest information on **J&L Extreme Line Casing,** which is manufactured under license from The National Supply Company.

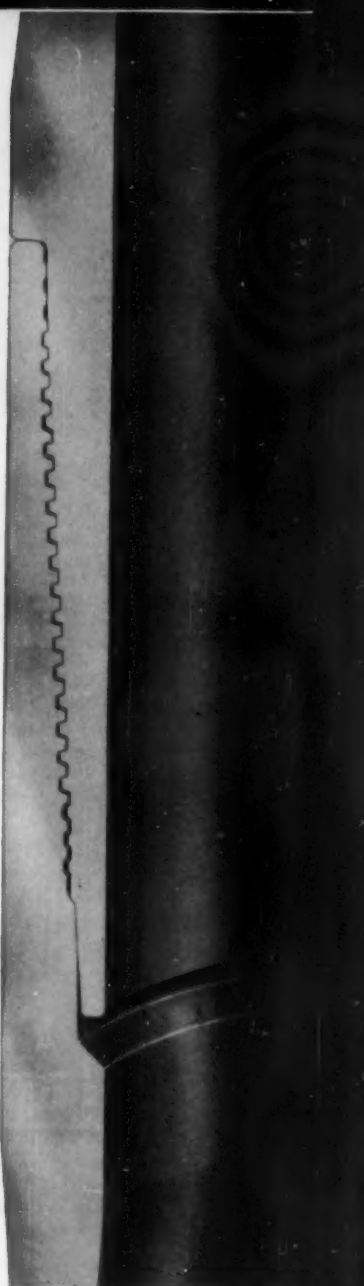
Call your local Jones & Laughlin Supply Division store or office.

Jones & Laughlin

SUPPLY DIVISION – Tulsa

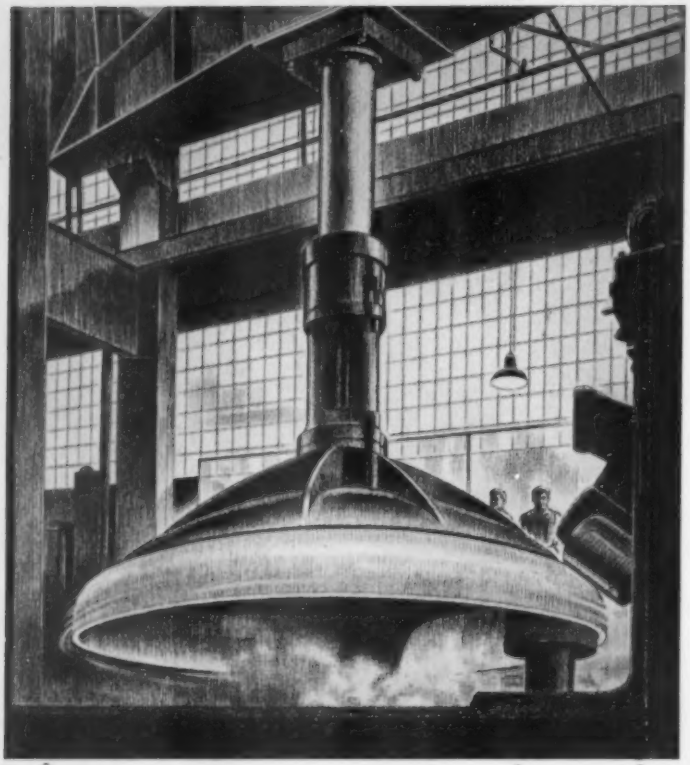
If it's sold by J&L....
It's the best available

66



Extreme Line Joint

Spinning saves Metal —cuts tool costs



Dished and flanged ends Rotarpress spun by Harveys greatly facilitate the design and production of Pressure Vessels of all kinds. These ends combine semi-ellipsoidal form with large knuckle radius, allowing a substantial reduction in plate thickness to be effected, and in most cases the preparation and cost of expensive tools is eliminated.

'ROTARPREST' ENDS FOR PRESSURE VESSELS

can be supplied in Mild, Alloy and Clad Steels and non-ferrous metals. The capacity of the Rotarpress ranges from 5 ft. to 15 ft. diameter and from 3/8 in. to 4 in. thickness; knuckle radii may be varied to meet individual requirements.

GET THE FACTS!

Our latest catalog gives details of the diameters and profiles to which 'Rotarprest' Ends can be produced, along with a table of tolerances and notes on the calculation of plate sizes for alternative flange depths. Send for Catalog No. OG 965.

Harvey

G. A. HARVEY & CO. (LONDON) LTD.
WOOLWICH ROAD, LONDON, S.E.7. ENGLAND
Cables: 'Cheaper, London.'

SPECIALISTS IN THE PRODUCTION OF DISHED AND FLANGED ENDS FOR THE PETROLEUM INDUSTRY.

WOLVERINE
TUBE
Items of Interest to the Processing Industry

PUBLISHED BY WOLVERINE TUBE DIVISION

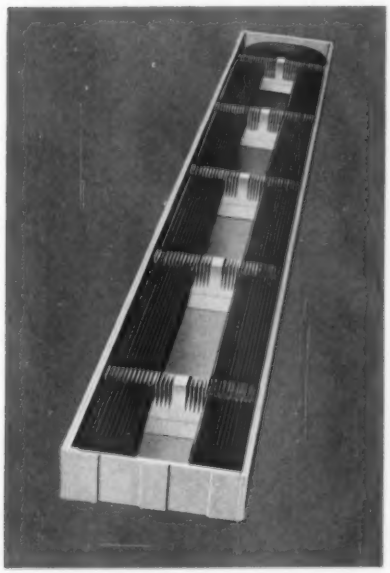
Wolverine Prefabs U-bends to your Specifications

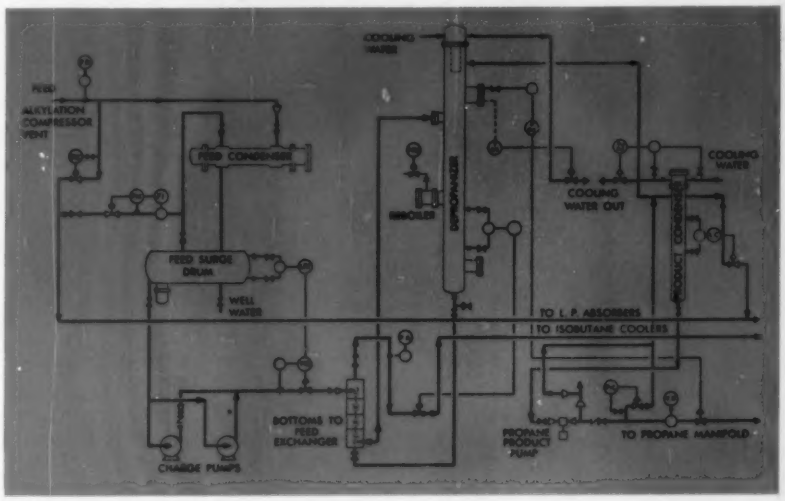
As a direct mill source Wolverine Tube prefabricates U-bend condenser tubes to your specifications — ships them in disposable type pallets in the exact order of their installation — ready for direct insertion into your heat exchanger or condenser.

In addition to real savings in assembly time, you minimize transportation, space and handling problems.

In prime surface form Wolverine U-bends are available in a wide range of sizes and alloys in copper and aluminum. Capacity boosting Wolverine Trufin U-bends (such as those used in this application) are available in copper, copper alloys, aluminum and seamless steel. Wolverine Trufin tubes can be furnished in straight lengths or bent to your specification and packaged as shown here.

Write for complete information — or have your Wolverine sales representative explain their advantages. He is as near as your telephone.





Here's How:

WOLVERINE TRUFIN® CUT COSTS IN ALKY-SYSTEM DEPROPANIZER

BY ERNEST DODD

In refining—as in all industry—using the *right* product at the *right* time can often result in savings amounting to thousands of dollars.

A recent article in a trade publication gives dramatic evidence of the value of low-fin (Wolverine Trufin) condenser tubes in the design of the above low-cost alky-system depropanizer at a large Gulf Coast refinery.

From the article: "The advantage for the internal heat exchangers, low-fin U-tube bundles, lies in the investment savings in shells, floating heads and separate foundations." — "The advantage to this design in terms of the first cost is achieved principally by locating the reboiler and the overhead condenser inside the tower.

"This was achieved by the use of finned tubes to obtain high heat input per cubic foot of tower volume. It is estimated that the savings in terms of externally located heat-exchanger shells and foundations are about $10,000. This saving is about 25 per cent of the cost of the tower itself, and 6 per cent of the total cost of the project."

The major components in the system were: (a) a feed condenser using 70° well water makeup to the reservoir as coolant; (b) a 60-foot high by 30-inch diameter tower using Spraybak cartridge packing for liquid and vapor contacting; (c) *an internal reboiler and reflux condenser;* (d) an external product condenser doubling as a product accumulator, a bottoms-to-feed exchanger and one product pump.

It was in the area of item (c) that Wolverine Trufin proved its ability as a money saver. Internal mounting was advantageous in this instance because of Wolverine Trufin's greatly increased surface area. This enabled the engineers to get more heat transfer surface into a given area thus obtaining a higher heat input per cubic foot of tower volume.

Where Wolverine Trufin is installed *savings* and *increased heat transfer performance* go hand in hand. Throughout industry authenticated cases such as that described here are becoming daily happenings.

May we suggest that you include Trufin tube in your engineering philosophy when designing heat exchangers for your use?

WOLVERINE TRUFIN TYPE L/C—Bimetal

PRIME SURFACE DUPLEX TUBING

WOLVERINE TRUFIN TYPE S/T—Duplex

WOLVERINE BIMETALLIC TUBE IS B-R*

* *(BOND RESISTANCE RATED)*

Designing new equipment using bimetallic or duplex type heat exchanger tube?

Then here's good news for you.

NOW — Wolverine Tube can tell you in advance exactly the amount of bond resistance between the inner and outer tubes of mechanically bonded tubing of dissimilar metals.

For example, production testing of Wolverine Trufin® Type L/C assures customers that this high-finned aluminum outer tube can be mechanically bonded to an inner liner of any desired metal and still maintain an assured and predetermined heat transfer rate. Equally precise production testing of resistance values can be given on all other Wolverine finned and prime surface duplex tubing.

With this information determined in advance by Wolverine's newly developed bond resistance testing machine, it is now possible to obtain increased accuracy of design for heat exchangers and condensers using duplex tubing. This is of greatest importance where such tubing is used to combat corrosion.

Write — NOW — for complete information or ask for a Wolverine Technical Sales Representative to call.

Wolverine Trufin is available in Canada through the Unifin Tube Division, London, Ontario.

CALUMET & HECLA, INC.
CALUMET DIVISION
URANIUM DIVISION
GOODMAN LUMBER DIVISION
WOLVERINE TUBE DIVISION

In Canada:
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WOLVERINE TUBE
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17238 Southfield Road
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Manufacturers of Quality-Controlled Tubing and Extruded Aluminum Shapes

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EXPORT DEPT. 13 E. 40TH STREET, NEW YORK 16, N. Y.

THERE IS NO BETTER HOOKUP

The standard for the oilfield

Combine an O-C-T casing head, O-C-T tubing head, master valve of your choice, and O-C-T flow control and you have the finest wellhead equipment that is available.

As a matter of fact, this hookup is rightfully called the "standard of the oilfield."

Simplicity is inherent in the design of each component. And the economy of this hookup is something to consider.

When you are ready for completion equipment, talk to the Oil Center Tool Company representative about the "standard."

O·C·T

OIL CENTER TOOL CO.

SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

Address Export Inquiries for All Countries to P. O. Box 3091, Houston, Texas.

where progress is a daily practice

US RUBBER PACKING

You may be. Consider this: How much does it cost you every time you shut down a production line to replace the packing in just one piece of hydraulic equipment? Now, multiply this by the amount of times this same equipment has had to be re-packed, say, in the past three years. And multiply this figure by the total amount of hydraulic equipment in your production system.

This downtime cost is enormous—just for packing. It's far higher than the cost of the packing itself ...and a lot more than the pennies saved by buying less expensive, inferior packing.

It's for this reason that packing like U. S. Matchless® is, by far, your most economical buy. It's made in a variety of styles, each for specific applications. Used and recommended by many of the leading original equipment manufacturers, Matchless is a packing you can trust to do the job longer, better... to turn downtime losses into uptime profits.

• • •

When you think of rubber, think of your "U. S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial rubber products.

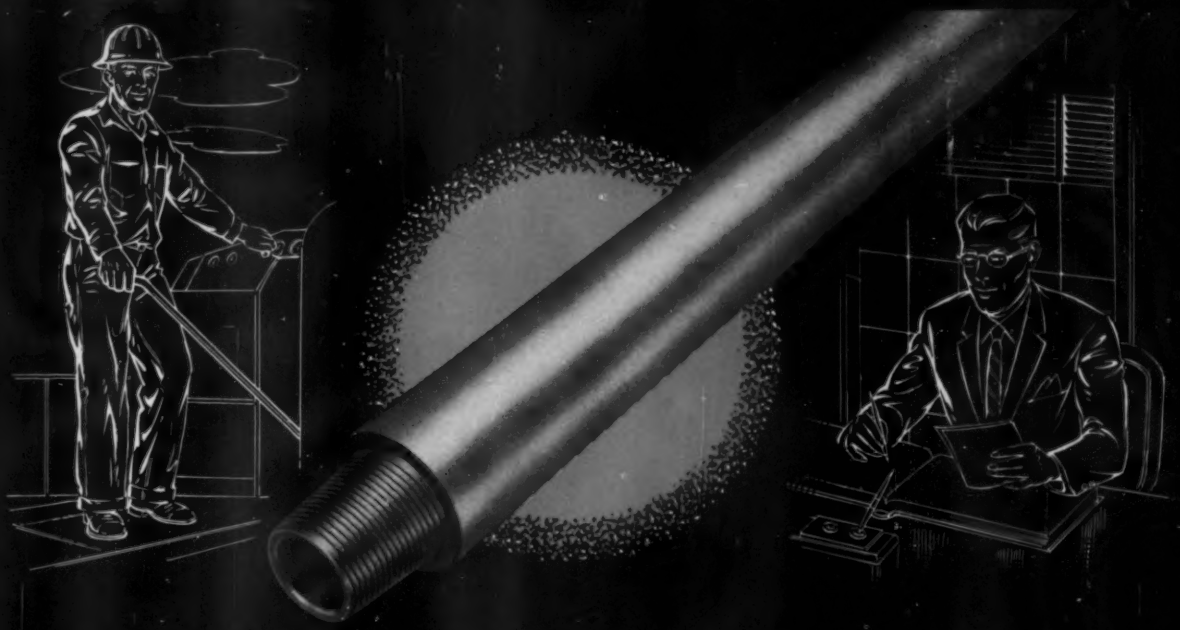
US RUBBER

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.



your driller and your accountant....
both of 'em like

BAASH-ROSS
Drill Collars

● Your cost accountant likes the **savings** shown by the consistent long service life of Baash-Ross drill collars, while your driller appreciates the extra margin of safety and dependability in Baash-Ross collars that keeps his string "turning to the right."

● Laboratory developed and field tested alloy steels are forged, turned, bored, threaded and heat treated under the most exacting of specifications and conditions to produce drill collars of outstanding quality. You can rely on your Baash-Ross drill collars to have perfect balance, accurately mating connections and the optimum combination of hardness, tensile strength and stiffness to meet every down-hole job requirement.

● Add to your drilling profits, order your next drill collar string from Baash-Ross. You will find Baash-Ross representatives in every oil producing area in the free world.

BAASH-ROSS Lifting Type Thread Protectors positively protect drill collar threads and shoulders while in storage or transit and the strong built-in bail with the rounded "glide" greatly simplifies drill collar handling at the rig. Box and pin units screw together for convenient storage.

For full information see Composite Catalog or write Dept. B 2-23, P. O. Box 1348, Houston 1, Texas

BAASH-ROSS DIVISION
OF JOY MANUFACTURING COMPANY

GENERAL OFFICES: 5306 CLINTON DR., HOUSTON, TEXAS

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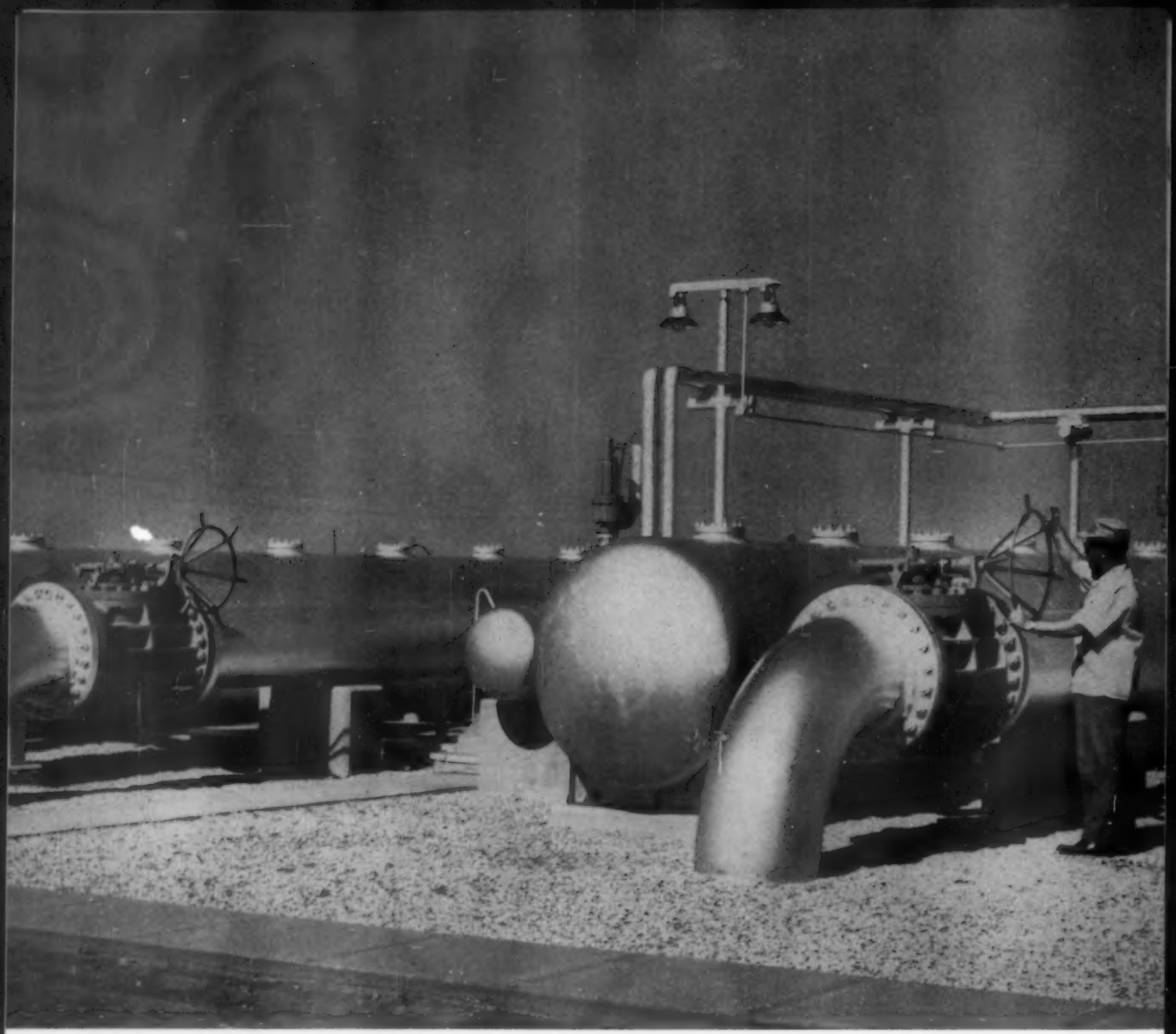
Houston, Texas; Odessa, Texas; Dallas, Texas; Long Beach, Calif.; Denver, Colo.; Oklahoma City, Okla.; Olney, Ill.; Mexico City, Mexico; Edmonton, Alberta, Canada.

FOREIGN OFFICES:
New York, N. Y.; Greenock, Scotland; London, England; Paris, France; Maracaibo, Venezuela; Buenos Aires, Argentina.

BAASH-ROSS JOY



CLOSES IN MINUTES . . . NOT HOURS!

Ordinary pipeline valves, in larger sizes, often take hours to open or close. The largest Rockwell-Nordstrom lubricated plug valve can be fully opened or fully closed as quickly as you want.

While the stem in ordinary valves must be "wound" through hundreds of turns to bring together and set the metal-to-metal seats, a Rockwell-Nordstrom valve is full open or full closed when the plug is rotated through only 90°. This quarter-turn operation is much easier because the plug rotates on a film of lubricant. And, the combination of the firmly seated tapered plug and the unique seal of pressurized lubricant assures really positive shut-off.

Whatever your needs, there is a Rockwell-Nordstrom valve that will do the job better, longer and at far lower cost. They cost no more to buy, often less, than ordinary valves. For details, see your supplier or write, Rockwell Manufacturing Company, Pittsburgh 8, Pa. Canadian Valve Licensee: Peacock Brothers Limited.

ROCKWELL-Nordstrom VALVES

it's ROCKWELL

MANUFACTURING COMPANY

SAVE money

SAVE manpower

SAVE maintenance

SAVE with Electric Flexibility

Electric Power *when* and *where* you need it

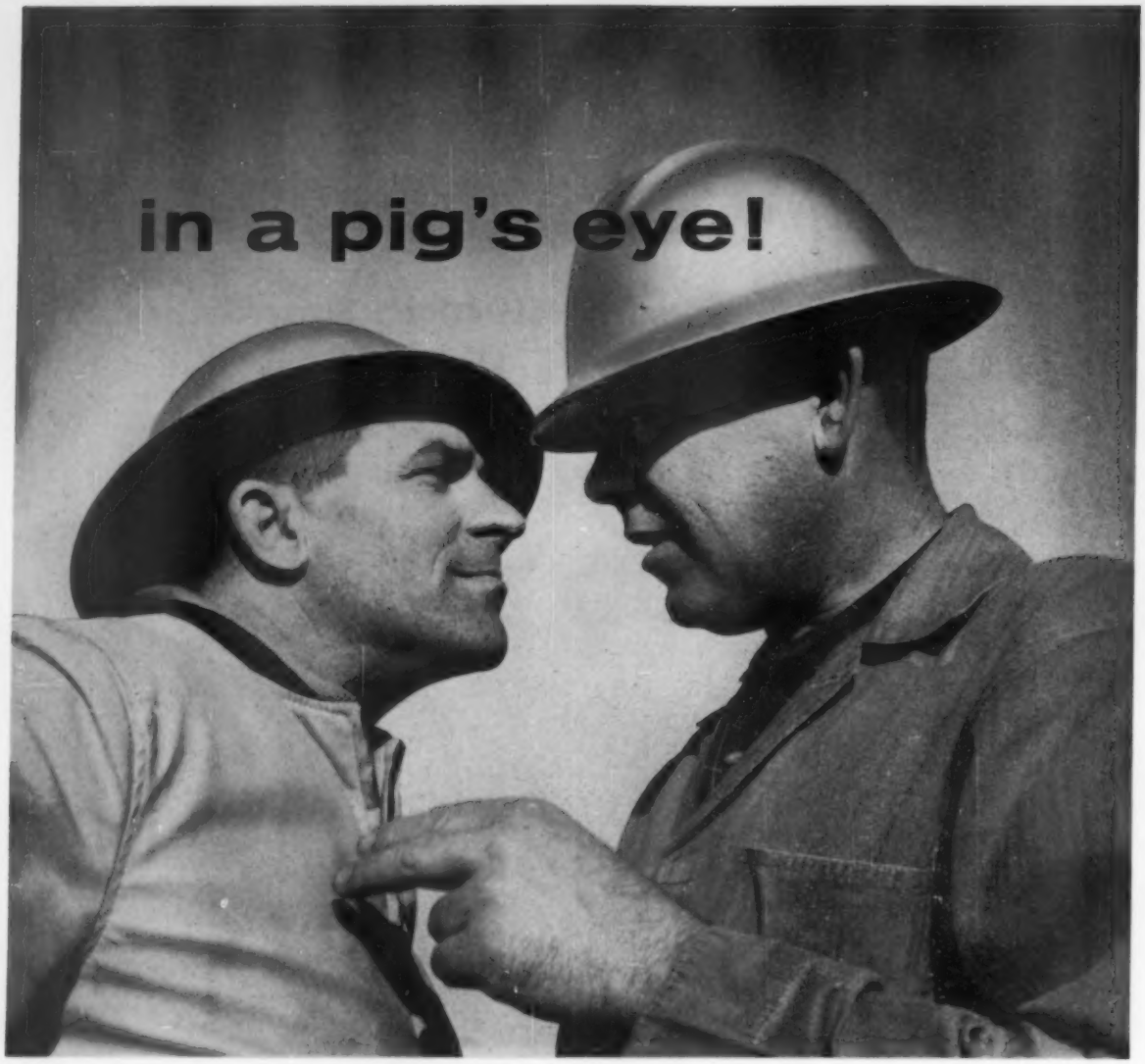
Dependable Purchased Electric Power is on the job 24 hours a day and operates on any fractional time schedule. This flexibility of Utility Electric Power to meet present producing requirements means a great savings in money, manpower and maintenance. Costs are cut to a minimum and yet pumping efficiency is held at the highest possible point. Whether you need electrification of your fields or simply added automation of control, call your nearest Utility Electric Power Company or write us.

Purchased Electric Power . . .
saves money, manpower, maintenance
and serves you better automatically

P.E.P.A.

Petroleum Electric Power Association

P.O. BOX 35006, DALLAS 35, TEXAS



THERE IS A DIFFERENCE IN VENTURI VALVES

The difference is Grove's compact body design. It permits a long, gradual taper of venturi valve hubs that gives you better flow characteristics than any other reduced opening valve. Ordinary valves have thicker bodies and a sharper taper of venturi hubs, causing increased line turbulence and resulting pressure loss.

Even with a port reduction of two to four basic pipe sizes, Grove Seal-O-Ring Venturi Valves have comparable flow capacity and pressure loss to so-called "full ported" rectangular port plug valves. And, they cost less too.

Before you buy any other valve, ask your local Grove man to give you the complete story on these fine valves.

GROVE VALVE and REGULATOR COMPANY

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HOUSTON 27—3203 Mercer St. • LOS ANGELES 6—2559 W. Olympic Blvd.

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FARMINGTON, N. M. • LAFAYETTE, LA. • HARVEY, LA. • LONGVIEW, TEXAS

In Western Canada: GROVE VALVE LTD., EDMONTON

5438

Pipeline on Wheels. Fleet of tankers made of USS "T-1" Steel by Butler Manufacturing Co., Kansas City, Missouri. Operated by E. Brooke Matlack, Inc.

Payload—up 60,000 gallons when Matlack switched to USS "T-1" Steel tankers built by Butler Mfg. Co.

"IT'S OBVIOUS why we switched to 'T-1' Steel for our fleet of 18 tankers—because they haul 60,000 more gallons a week than conventional units would." So says Bob Matlack, Executive Vice President of E. Brooke Matlack, Inc., Philadelphia, the nation's largest liquid transportation firm.

"Early in 1956," explained Mr. Matlack, "we decided that if we were going to expand in the field of propane shipments, we would have to take some positive action. So we *retired* the five old-style, twin-barrel tankers we had and ordered five new tankers of a unique blimp design made of USS 'T-1' Steel. At the same time we were able to reduce our shipping rates up to 15% for all of our customers.

"The results have been fabulous. We experienced a jump in volume and are now running 18 'T-1' Steel tankers, pushing propane six days a week around the clock."

The empty weight of the old tankers was 24,000 pounds while the "T-1" tankers weighed only 19,500 pounds. This was a clear saving of 4,500 pounds, which meant the "T-1" Steel tankers could carry from 500 to 700 extra gallons of propane per trip, depending on the temperature.

USS "T-1" Constructional Alloy Steel has a minimum yield strength of 90,000 psi in code-governed applications, permitting design to high working stresses. That's why you get such a large increase in payload by taking advantage of "T-1" Steel's strength and weldability. Write for the complete story on USS "T-1" Steel: United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

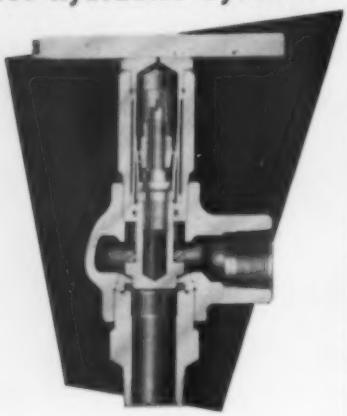
USS and "T-1" are registered trademarks

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company

United States Steel

NEW from KINZBACH

a Long Life Manual Reset Relief Valve for Hydraulic Systems



This field proved safety valve for hydraulic systems delivers instantaneous relief at full capacity

Designated the Model 115, this manually reset relief valve has these outstanding features:

A piston-type shut-off with easily replaceable piston and seat with molded-in seal.

A bumper ring assembled on the piston and capable of absorbing the energy of impact as the piston moves to the "open" position.

An adjustable restraining means holding the piston in the "closed" position until set pressure is exceeded.

Restraining elements may be adjusted for any set pressure within the range of the valve.

A reset punch attached to the cylinder cap.

Functional testing for full system protection, since restraining elements are not destroyed at each action.

KINZBACH TOOL CO INC

Remember, for better relief valves, specify Kinzbach. Write today for detailed catalog on this and other relief valves.

KINZBACH TOOL CO., INC.

P. O. Box 277 Houston, Texas

Export: 74 Trinity Place, New York, N.Y.

They Say—

Tidelands mess "deplorable"

Dear Sir:

Your issue of November 10, 1958 (p. 113) contains a statement that "the lapse in offshore drilling is purely an economic problem and not one of discouragement at all." Don't you feel that this ignores one of the very real reasons for the offshore drilling inactivity? Personally, I feel the aura of doubt concerning ownership of the tidelands area is a big factor in this slow up.

Something I cannot understand is the almost complete lack of editorial comment concerning what I consider to be a deplorable situation. The Supreme Court had called this case for hearing in October and, as the date approached, made the announcement that it had been postponed indefinitely.

Articles in your own publication refer to the so-called tidelands area as the largest untapped reserves of crude oil in the United States. While little comment is devoted to the fact that this great potential reserve shou'd be developed in case of emergency need, volumes of space are devoted to tirades against imports as threatening the development of oil in the U. S.

If these reserves are not vitally important to the future of this country were it faced with another international war, I miss my guess. In view of this, don't you think it would be prudent for the publications of the industry to begin beating some drums?

Benjamin W. Heath
Catawba Corp.
New York.

OGJ, AAPG wildcat lists vary

Dear Sir:

Just for the record, we hope you can help clarify for us the difference between the number of exploratory wells drilled annually as reported by The Oil and Gas Journal in its January 27 Annual Review-Forecast issue and the number reported by the American Association of Petroleum Geologists in its annual exploratory drilling reports.

The total number of exploratory wells drilled was reported by the Journal as follows:

1957	11,739
1956	13,034
1955	12,271

The AAPG, on the other hand, lists the following breakdown:

	1957	1956	1955
Outposts	3,217	3,623	3,204
New-pool wildcats	2,946	3,226	2,931
Deeper-pool tests	411	464	465
Shallower-pool tests	119	151	233
New-field wildcats	8,014	8,709	8,104
Total	14,707	16,173	14,937

We are frankly puzzled by the conflicting sets of figures and would greatly appreciate any explanation you can give us of the difference between the two reports.

Edward J. Mulligan
Economic Research Section
Committee on Public Affairs
American Petroleum Institute
New York

(Editor's note: Journal wildcats generally are those 1 mile or more from production, deep tests in a known field, or those opening a new pay in an old field. They will generally include AAPG's "new - field wildcats" and "deeper-pool tests." Many AAPG "outposts" and "shallower-pool tests" will not appear in Journal wildcat figures, which are consistently below those of AAPG. The discrepancy results from the methods of classifying wells. We have the utmost respect for the AAPG figures, which we publish annually, but feel no comparison should, or could, be drawn.)

Los Angeles has plenty of gas

Dear Sir:

We note in the Newsletter section of the December 8 issue of The Oil and Gas Journal an article concerning the recent ban on fuel oil burning in Los Angeles County.

Reference was made to a recent severe smog attack and conditions which purportedly demonstrated the inadequacy of gas supplies necessary to support a complete ban on fuel-oil burning. The article further asserted that peak gas requirements would reach 2.166 billion cubic feet per day during periods when fuel oil was banned and that these peak demands could not be supplied.

To support these assertions the article cited one isolated example of a peak day which occurred on November 17, 1958. The gas usage figures quoted for that day were fairly accurate; i.e., total sendout was 1.963 billion cubic feet and total curtail-

TELETAX* TELEMETERING

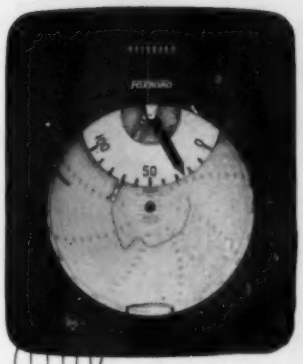
by Foxboro...

engineered for the most advanced transmission techniques

Telemetering matched in performance with famous Foxboro instruments — that's the Foxboro Teletax Telemetering System.

Through use of impulse-duration signals, Teletax electrically transmits measurements of a remotely-located variable to the central control station. Here, the Teletax receiver records the duration of impulse, which is directly proportional to the measured variable.

The Foxboro Teletax System is noted for its simplicity, its versatility, and its high sustained accuracy. For a transmission medium, it can use either AC or DC, an audio frequency carried on a transmission line, or radio or microwave impulses. Sustained accuracy is 0.5% of full scale.



TELETAX RECEIVERS

Teletax receivers include: Single or Dual Receivers; Multi-Record Receivers for recording up to 6 separate measurements on one chart; and Teletax Receiver-Controllers for automatic operation. And the Teletax signal can be simply converted to digital information.

TRANSMISSION LINK

With Foxboro's Teletax Telemetering System, you can use the most advanced transmitting techniques: two wire lines, power lines, radio or microwave. As many as 25 different signals can be handled in each direction, simultaneously.

TELETAX TRANSMITTER

The Teletax Transmitter houses either one or two standard Foxboro measuring elements — plus the Teletax transmitting mechanism. It will transmit to a control center hundreds of miles away just as easily as to one nearby. It also indicates or records locally if desired.

The Teletax Transmitter needs no periodic maintenance whatever, while the receiver requires only occasional oiling. And the receiver has a minimum of mechanical components to wear — no clutch to slip or jam.

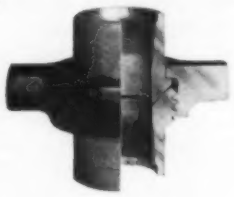
Foxboro Teletax Systems are now in wide use on natural gas systems, water works, oil fields, power plants, steel mills, etc. Write for Bulletin 17-11C — it gives all the details. **The Foxboro Company, 602 Neponset Avenue, Foxboro, Mass.**

FOXBORO
REG. U.S. PAT. OFF.

TELETAX TELEMETERING

THERE IS A DIFFERENCE IN UNIONS -

Look at WECO!



You'll see the difference in their carefully machined seats, the accurately cut Acme threads, the precision machined pipe ends, the deep knurling on the subs that assure safe positive wrenching.

You can't see or feel the rigidly controlled heat treatment but you will know it's there when your WECO Union seats and seals perfectly after hundreds of make-up and break-outs.

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ment was approximately 203 million cubic feet.

There were several important factors which should be considered with regard to the November 17 episode:

1. Firm load requirements were higher for this period than anticipated because of unusually low temperatures. System operating conditions at the time would not allow emergency gas sendout.

2. Gas was coincidentally in short supply at the time because of an unexpected pipeline breakdown in El Paso.

3. On November 17 there was a weak inversion but no eye irritation in the Los Angeles Basin. Wind speeds ranged from 9 to 12 miles per hour.

Normally, the peak load of November 17 could have been supplied without any difficulty. In fact, on December 19, 1958, there was a total gas sendout of 2.156 billion cubic feet, without any curtailment, or 193 million cubic feet more than the total sendout on November 17.

At the present time, the gas supply situation is such that peak demands of as high as 2½ billion cubic feet can easily be met. The pipeline system expansion now in progress will soon make it possible to supply peak demands of up to 3½ billion cubic feet daily.

S. Smith Griswold
Air Pollution Control Officer
County of Los Angeles

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

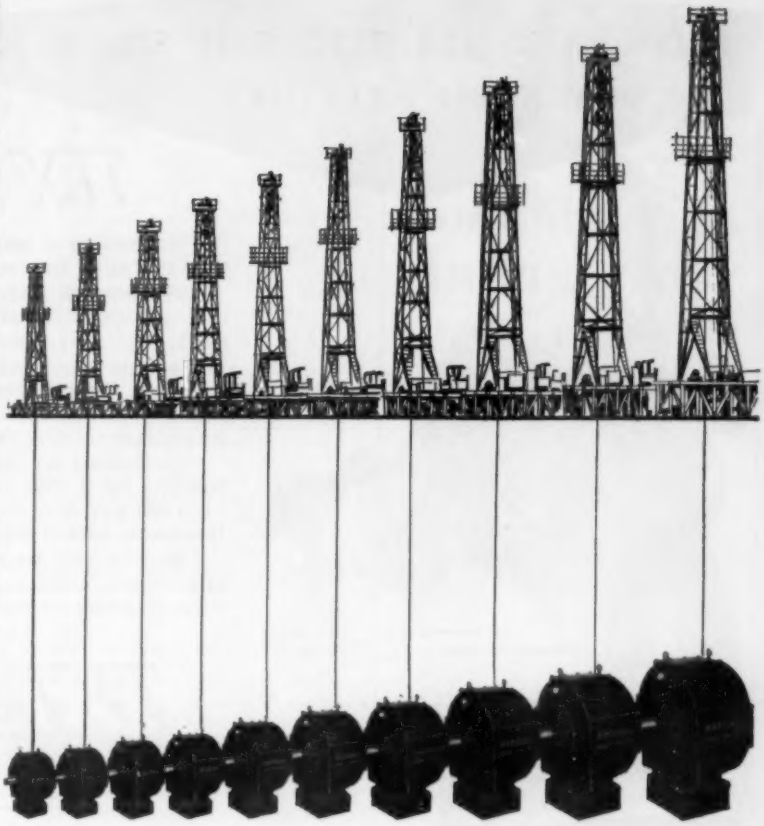
CALENDAR

FEBRUARY

24-25 University of Oklahoma, sixth geological symposium, Norman, Okla.
24-26 Oklahoma State University, natural-gas engineering conference, Stillwater, Okla.
25 Petroleum Equipment Suppliers Association, Mid-Continent and Rocky Mountain district meeting, Mayo Hotel, Tulsa.
26 American Society for Testing Materials, southwest district annual meeting, Houston.
26-28 Pipe Line Contractors Association of Canada, fifth annual convention, Castle Harbour Hotel, Bermuda.
27 Natural Gasoline Association of America, Permian basin regional meeting, Scharbauer Hotel, Midland, Tex.

MARCH

3 Petroleum Equipment Suppliers Association, Pacific district, annual membership meeting, Ambassador Hotel, Los Angeles.
4-5 University of Oklahoma, gas-processing conference, Norman, Okla.
4-6 American Petroleum Institute, Divi-



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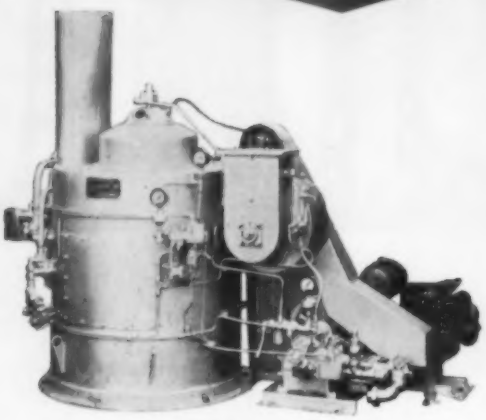

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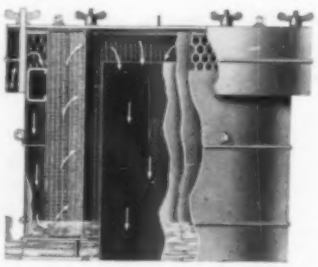

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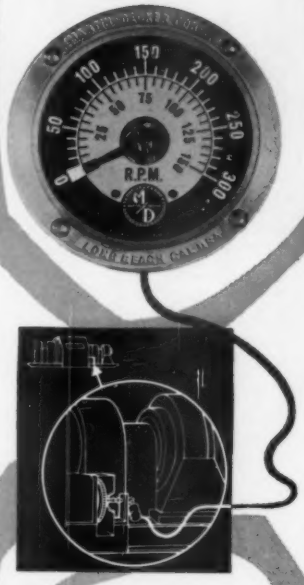

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WRITE FOR DESCRIPTIVE LITERATURE

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sion of Production, southwestern district meeting, Hotel Scharbauer, Midland, Tex.

5-6 Southern Gas Association, transmission management conference, Jung Hotel, New Orleans.

6 Natural Gasoline Association of America, Gulf Coast regional meeting, Robert Driscoll Hotel, Corpus Christi, Tex.

7 American Chemical Society, Oklahoma tetrasectional meeting, University of Tulsa, Tulsa.

8-11 American Society of Mechanical Engineers, gas turbine power conference and exhibit, Netherlands-Hilton Hotel, Cincinnati.

9-11 Midwest Gas Association, annual meeting, Hotel Fort Des Moines, Des Moines.

11 Petroleum Equipment Suppliers Association, southwestern district, annual membership meeting, Shamrock Hilton Hotel, Houston.

13 American Institute of Chemical Engineers, Sabine area section; American Chemical Society, Texas-Louisiana Gulf section; sixth annual joint technical meeting, Lamar State College of Technology, Beaumont, Tex.

16-18 Western Petroleum Refiners Association, forty-seventh annual meeting, Hilton Hotel, San Antonio, Tex.

16-19 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, forty-fourth annual meeting, Memorial Auditorium, Dallas.

16-20 National Association of Corrosion Engineers, fifteenth annual conference, Hotel Sherman, Chicago.

17-18 Manufacturing Chemists' Association, air and water-pollution abatement conference, Netherlands Hilton Hotel, Cincinnati.

18 Petroleum Equipment Suppliers Association, eastern district, annual membership meeting, Duquesne Club, Pittsburgh.

19-20 New England Gas Association, annual meeting, Hotel Statler, Boston.

21 North Texas Oil and Gas Association, twenty-ninth annual meeting, Kemp Hotel, Wichita Falls, Tex.

23-24 University of Oklahoma, second conference on theory of fluid flow through porous media, Norman, Okla.

25-27 American Petroleum Institute, Division of Production, southern district meeting, Roosevelt Hotel, New Orleans.

31 Seventh annual meeting, Philadelphia-Wilmington section of American Institute of Chemical Engineers, and University of Pennsylvania, Philadelphia.

29-Apr. 2 American Society of Mechanical Engineers, instruments and regulators division conference, Case Institute of Technology, Cleveland.

APRIL

2-3 Society of Petroleum Engineers of AIME, Rocky Mountain petroleum section, Casper, Wyo.

2-3 American Institute of Mining, Metallurgical, and Petroleum Engineers, technical conference on stress corrosion, Mellon Institute, Pittsburgh.

2-6 Geological Society of America, Cordilleran section, annual meeting, University of Arizona campus, Tucson.

5-10 Engineers Joint Council, nuclear congress, Cleveland Auditorium, Cleveland.

5-10 American Chemical Society, national meeting, Boston.

6-7 Instrument Society of America, sec-

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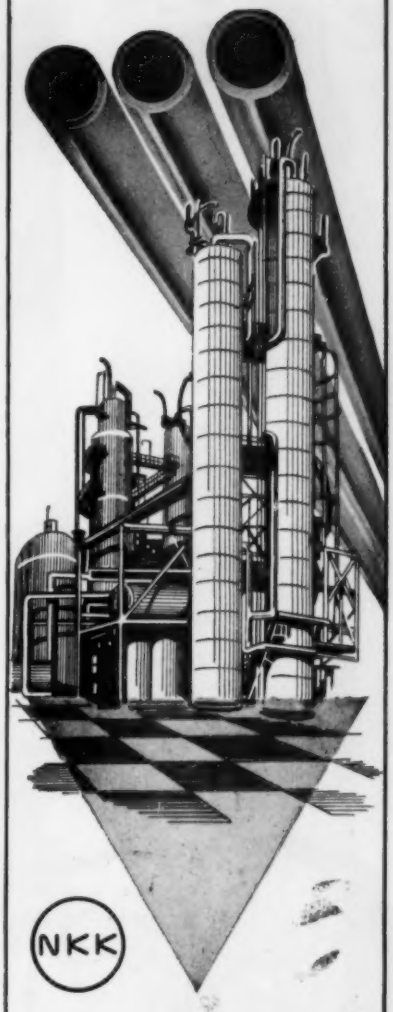
For Oil & Gas Industries



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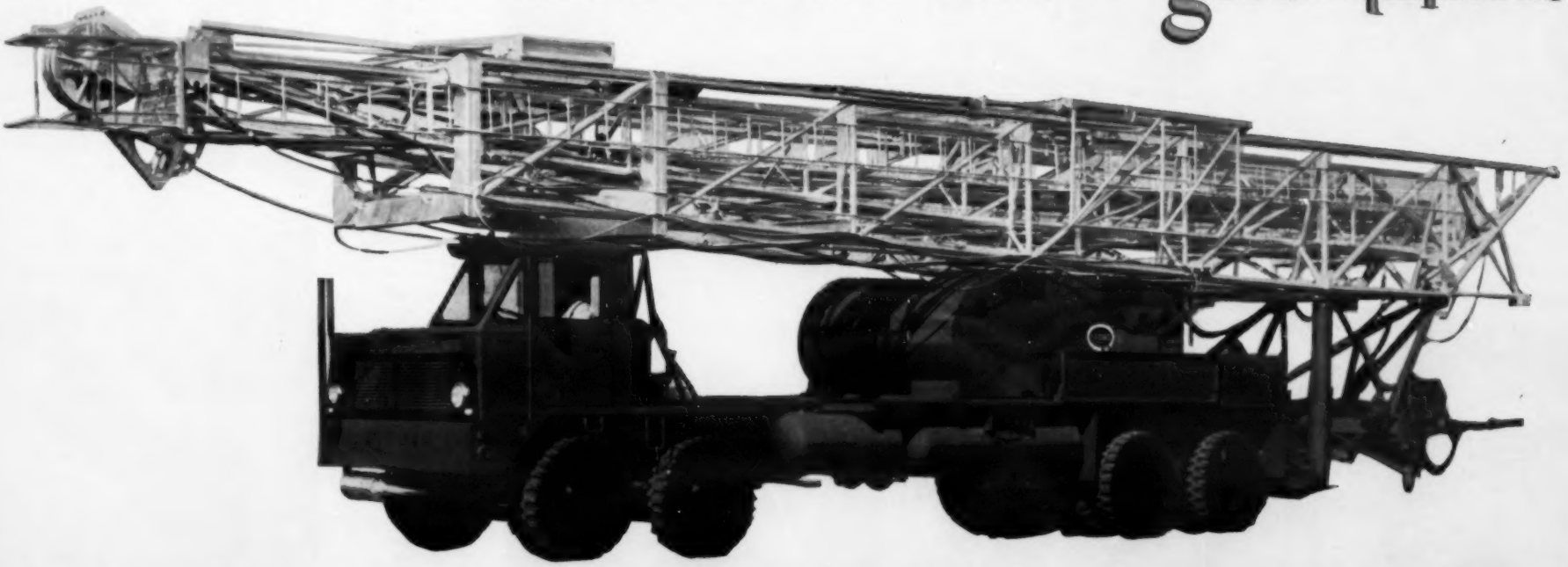

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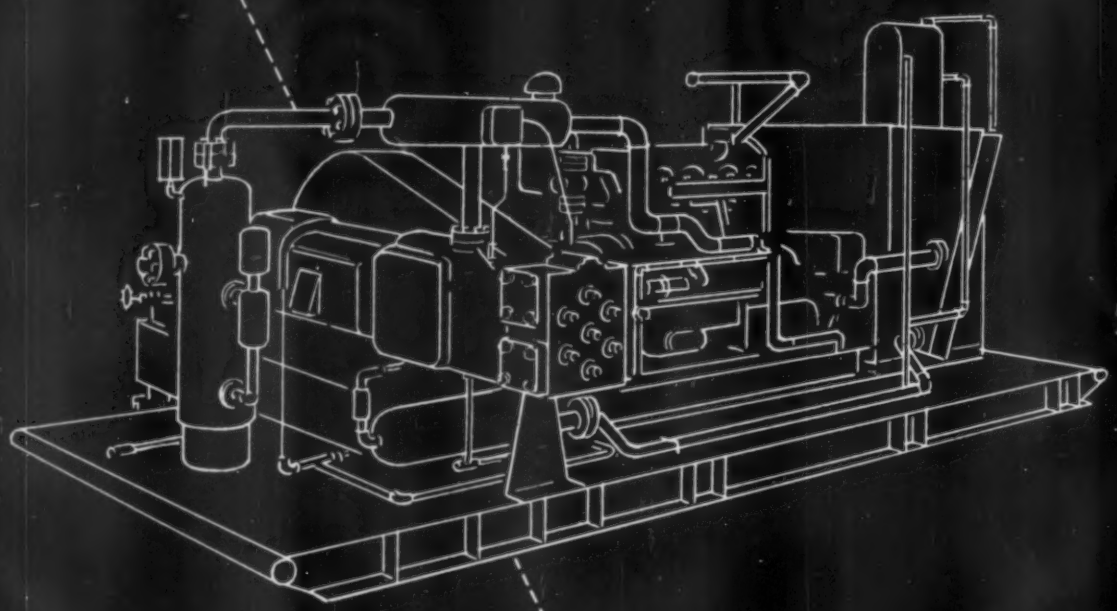

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ond national symposium on chemical and petroleum instrumentation, St. Louis.

7-8 Sixth Gas Compressor Institute, sponsored by University of Kansas and Southwest Kansas petroleum industry, Randall's Cafeteria, Liberal, Kans.

8-10 American Petroleum Institute, Division of Production, eastern district meeting, Penn-Sheraton Hotel, Pittsburgh.

14 Independent Oil Men's Association of New England, annual meeting. Hotel Statler, Boston.

14-16 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman.

15-17 National Petroleum Association, semiannual meeting, Hotel Cleveland, Cleveland.

15-17 American Petroleum Institute, Division of Transportation, annual tanker conference, Jung Hotel, New Orleans.

16-17 Rocky Mountain Oil and Gas Association, midyear meeting, Casper, Wyo.

18-22 Petroleum Equipment Suppliers Association, twenty-fourth annual meeting, Boca Raton Hotel and Club, Boca Raton, Fla.

19-23 American Society of Mechanical Engineers, oil and gas power conference and exhibit, Shamrock-Hilton Hotel, Houston.

22-24 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Herring Hotel, Amarillo, Tex.

22-24 Natural Gasoline Association of America, thirty-eighth annual convention, Baker and Adolphus Hotels, Dallas.

23-24 Sixth annual West Texas oil lifting short course, Texas Technological College, Lubbock, Tex.

24-25 Society of Economic Paleontologists and Mineralogists, Pacific Coast section, annual spring field trip, Boulder Creek area of Santa Cruz Mountains, California.

26-28 Texas Independent Producers and Royalty Owners Association, membership meeting, Baker Hotel, Dallas.

27-28 Society of Exploration Geophysicists, annual midwestern meeting. Cortez Hotel, El Paso, Tex.

29-30 Western Petroleum Refiners Association, Southwest regional technical-industrial relations meeting. Hotel Paso del Norte, El Paso.

29-30 Pacific Coast Gas Association, operating section, transmission conference, El Mirador Hotel, Palm Springs, Calif.

30-May 1 American Petroleum Institute, Division of Production, Pacific Coast district meeting. Biltmore Hotel, Los Angeles.

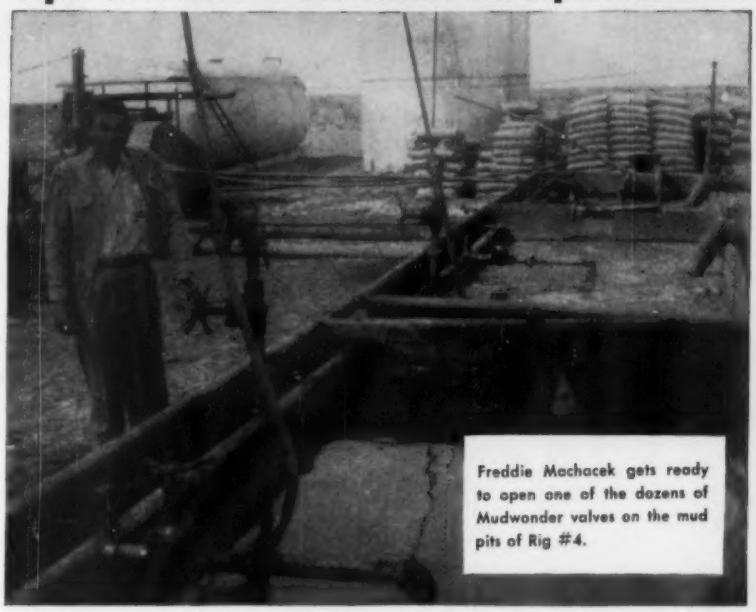
MAY

1 Fourth annual petroleum accounting conference, sponsored by Wichita chapters of the Petroleum Accountants' Society of Kansas, National Association of Accountants, the Kansas Society of Certified Public Accountants, and the University of Wichita, Lassen Hotel and University of Wichita campus, Wichita.

3-6 Liquefied Petroleum Gas Association, twenty-eighth annual meeting and trade show, Conrad Hilton Hotel, Chicago.

4-7 American Geophysical Union, annual meeting, Washington.

Tips on Mud Valves for Toolpushers . .



Freddie Machacek gets ready to open one of the dozens of Mudwonder valves on the mud pits of Rig #4.

MUDWONDER Ideal for Versatile Service

by Freddie Machacek, Toolpusher, Rig #4
B.B.M. Drilling Company, Midland, Texas

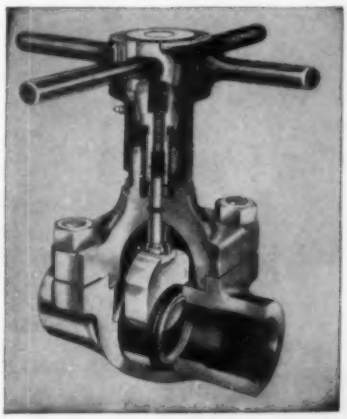
ABOUT two years ago I put a *Mudwonder* valve on our fill-up line just to see how it would make out. I soon found that *Mudwonder* worked fast and easily, without binding, even while bleeding off the line at 1600 lbs pressure. It did so well I tried more *Mudwonders* on the tough job of mud pit service—and they were so successful I've standardized on *Mudwonder* ever since!

Valves on mud guns and jets take a terrific beating, but we've had very little trouble with *Mudwonders.* As a matter of fact, our first ones are still in service; we replaced the stem packing on one valve—that's all! Because replacement parts are so easy to identify, we never have any trouble getting the exact part we need. In fact, the valves are designed to use the same seat and gate for both pressure classes.

When we have to dress a *Mudwonder,* the job can be done without disturbing any connections. The valve is out of service only about 10 minutes, start to finish, regardless of size. Another thing—they never sand up. Bob Lawrence, Edward *Mudwonder* Representative, says this is because the design causes the mud to flush the bonnet automatically.

Mudwonder valves are available in 2", 3" and 4" sizes; with screwed or flanged ends; rated at 2000 psi WP (4000 psi test) and 3000 psi WP (6000 psi test). See your favorite oil field supply store for complete information, or write Edward Valves, Inc., East Chicago, Indiana, subsidiary of Rockwell Manufacturing Company.

Mudwonder cut-away view shows the one-piece seat insert, with Buna-N molded integrally over steel wear rings; chromed gate with "T" slot connection; separated stainless stem and double thread construction.



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JOURNALLY SPEAKING

Depletion in Church

THE OTHER evening, at a church men's group, we eavesdropped on an informal bull session on the oil industry's depletion allowance.

A manufacturer, who admitted he knew nothing at all about the oil business, was beefing about taxes in general and bemoaning the fact that his depreciation allowance wasn't enough to cover the cost of buying new equipment to replace old machines that had become obsolete.

Then, in all innocence, he said: "Of course the oil industry isn't bothered by that because it has the special privilege of the depletion allowance."

That nearly started a riot.

There were half a dozen oil men in the group, and they all began talking at once in an attempt to explain and defend depletion.

It quickly became obvious that (A) all the oil men fervently believed that depletion is something that oil just has to have and would be dead without, but (B) none of them had more than the foggiest notion what depletion is, how it operates, or how to explain and justify it.

A production engineer, who had the ability to talk louder and faster than the rest, expounded at length about reservoir-decline curves, property evaluation, and lifting costs. His technical lingo lost the manufacturer at the first curve, but most of what he said had very little bearing on depletion anyway.

Then a geologist managed to get the floor and announced:

"All you need to say to justify depletion is that it's an incentive to find oil. We've got to have it to stay in business, and the country's got to have it to have any oil. We've found the oil and that's proof enough that 27½% is right. All your other arguments have no bearing on the case."

When the protests died down a man from the treasury department of an oil firm managed to get himself heard. He talked very authoritatively about tax regulations and accounting practices, but only a CPA could have understood him.

Several other oil men managed to get a few words in edgewise, but they only argued with each other. It turned into a free-for-all that generated much more heat than light.

All this time the poor manufacturer who had started it all sat silent but obviously completely unenlightened. Finally there was a lull in the shouting that permitted him to make his second mistake of the evening, He asked:

"Well what's this I hear about oil producers getting some kind of a double deduction from their taxes?"

Immediately everyone started talking at once about expensing intangible drilling costs, and getting into arguments with each other.

The manufacturer obviously didn't know an intangible from a tangerine, and we're positive he didn't learn anything from the "explanations" offered by his oil-men friends.

But we learned something. We learned that the average oil man is completely incapable of explaining depletion to anyone who is not an oil man or an economist or a tax attorney. They don't speak the same language.

And the reason they can't explain it is that they don't understand it very well themselves. And if most oil men are as confused and as inarticulate as those in this church group, it's no wonder the general public is bewildered.

That's why our staff prepared the 16-page special article on depletion that starts on page 99 of this issue.

We hope this will give oil men a better understanding of the subject. But that's just the first step. What we really hope is that oil men will use this to explain depletion to their neighbors and their congressmen and their newspaper editors and anyone else who will listen.

This piece doesn't answer all the questions that may be asked about depletion. But we intend to follow up with a series of questions and answers in subsequent issues of the Journal. So digest this first, and then watch for the sequels.

Then make another try at explaining it to your church—or golf—acquaintances.

—Henry D. Ralph

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How to protect oil's percentage depletion

THE increasing political attacks on depletion must be offset by a new type of program conducted by the entire industry and directed to the thinking portion of the general public. It cannot be left to the industry's technical tax experts and legislative representatives.

In some ways the industry's spokesmen have done well. They have answered the long-haired criticisms of some theoretical economists with equally long-haired and technical defenses.

In legislative chambers and committees they present a convincing body of detailed facts and statistics. But unfortunately some of the political attackers are not much concerned with either the theories or the facts of depletion.

THE REAL DANGER to depletion lies not with the theorists nor the oil-baiting professional politicians. It is with that large segment of the public which has absorbed fragments of the half-truths and untruths voiced by those two groups.

These people have a vague notion that there must be something wrong with depletion because it is talked about so much. This encourages political opportunists to attack the oil industry on a subject their constituents don't understand.

So now the field for industry action is those voters and opinion leaders sufficiently interested to inform themselves if information is readily available and easily understood. If they can be convinced that depletion is sound and just, the long-hairs and the demagogs will have little support.

The way to reach such people is with simply worded explanations, free from the confusing details and jargon of accountants and tax attorneys. Much —not all, but the bulk—of the voluminous printed explanations of depletion has been prepared by people so close to the subject that their language is not understood by a layman.

Even the average oil man, it would seem, does not understand depletion well enough to explain it intelligibly to his neighbor down the street. Many oil companies and associations are doing much to correct this, but until the average oil man understands it thoroughly there is little chance of influencing the general public.

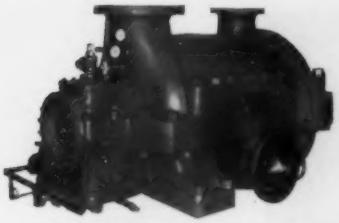
THE SIMPLE FACT about depletion is that it is designed to serve the public interest, not as a particular benefit for oil producers. It serves two basic objectives: To avoid taxing capital as income, and to maintain the nation's supply of oil and gas.

If enough of the general public can be made to understand this, the battle will be won. But the groundwork must be done now for the future.

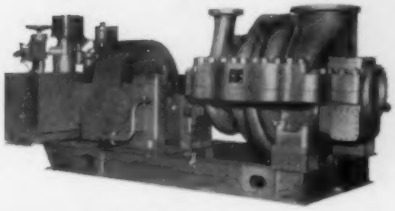
As a contribution to this end the Journal presents in this issue a summary of the case for depletion, written as simply as we know how.

John L. Parris, *Manager Centrifugal Compressor Sales, The Cooper-Bessemer Corporation, explains...*

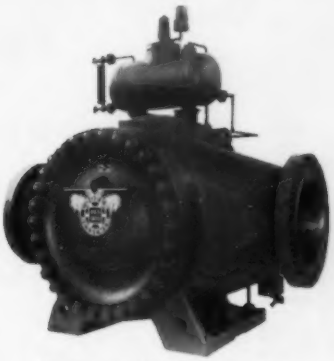
How you gain four ways when you specify Cooper-Bessemer Centrifugal Compressors



Horizontally split, process air or gas centrifugal compressor. Range: Up to 100,000 cfm.



Horizontally split, intercooled centrifugal compressor designed for low cost shop and process air and gas. Up to 30,000 cfm.



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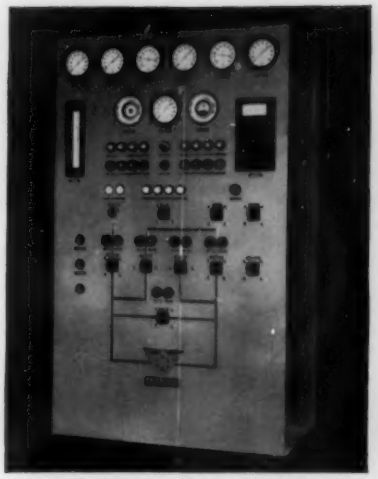
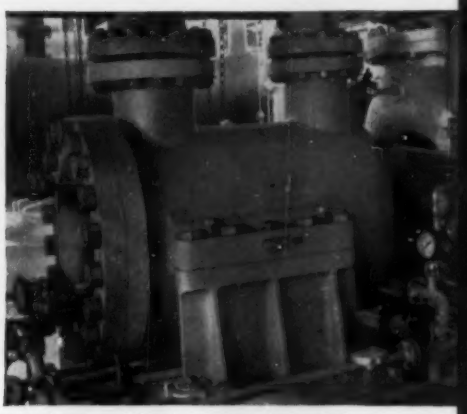


Installations can be integrated with Cooper-Bessemer En-Tronic Controls all the way from simple monitoring to complete system automation.



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3. You can get undivided responsibility. We can engineer the entire compressor installation, including drive and controls. Cooper-Bessemer En-Tronic Controls are available to provide any degree of automation.

4. You get service for most profitable performance. Our outstanding field service and warehouse facilities assure prompt attention to your operating needs... with resulting reduction in your inventory and downtime.

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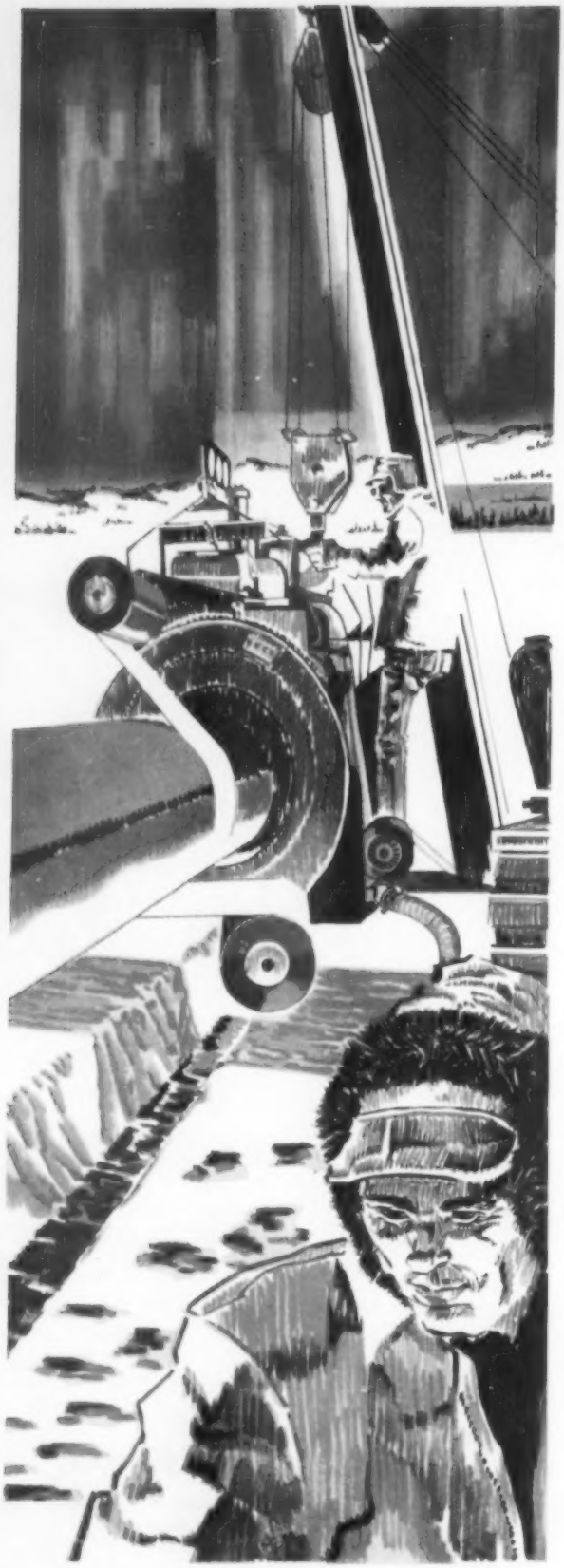

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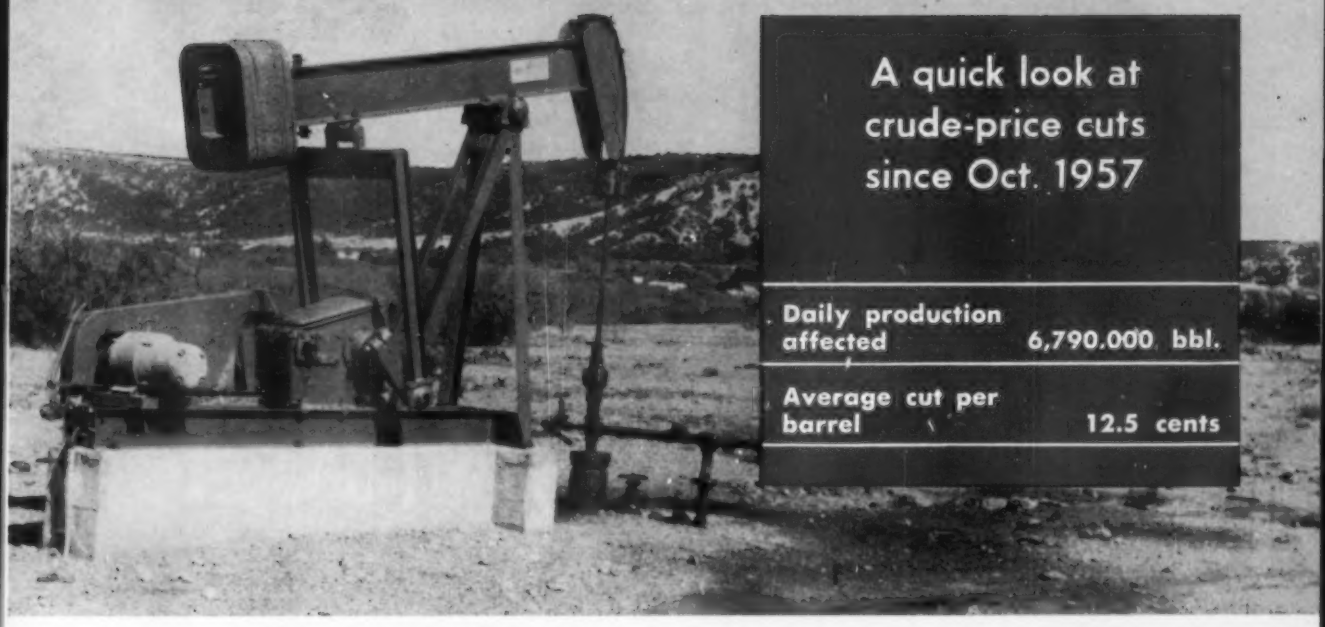


A quick look at crude-price cuts since Oct. 1957

Daily production affected	6,790,000 bbl.
Average cut per barrel	12.5 cents

Period of Stable Prices May Be Ahead

● Producers hope so because cuts in last 17 months have eroded away half of their last increase, a 25-cent a barrel hike in 1957. What happens now will depend on demand, world production, and import controls in U. S.

PRICE CUTS on Middle East crude last week left oil men in the United States wondering whether they were viewing the end of a price-cutting cycle or the beginning of another round.

British Petroleum Co. lopped 18 cents a barrel off the price of Middle East oil, citing principally as the reason earlier cuts in Venezuela.

Postings in Venezuela on light crudes had been cut 5 to 15 cents a barrel by buyers there who blamed their cheapened position on a long series of price cuts in the United States climaxed with reductions in West Texas.

The domestic cuts in West Texas and other oil-producing areas originally were laid to competition stemming from imports of foreign crude.

Now, with most foreign crude even cheaper than when the domestic price slide started 17 months ago, will producers be faced with another series of price cuts?

Many oil economists believe—and all hope—that the industry generally can expect a period of stable prices ahead.

They reason that the crude price weakness is due to a world oversupply of oil aggravated by a poorer than expected increase in demand and depressed prices for products.

With demand improving and the refiners' pinch eased slightly by lower crude costs and firmer product prices, oil prices should stabilize.

This trend, however, could be upset if imports in this country should go uncontrolled or if the rulers of oil-producing countries abroad should pressure for stepped-up production.

The U. S. picture . . . Crude price stability can't come too soon for domestic oil producers.

Since October 1957, they have lost at least half of the 25-cent price increase which went into effect early in 1957 following the Suez crisis. A special study by The Oil and Gas Journal indicates the weighted average of announced cuts in the 17-months' period is 12.5 cents per barrel.

In many cases individual crudes suffered greater cuts, ranging as high as 50 cents a barrel and as low as 3 cents. The lower gravities and sour crudes also often suffered larger penalties when some postings in West Texas, New Mexico, Oklahoma, and Kansas imposed a 3 and 4-cent downward differential on heavier oils.

Since October 1, 1957, a total of 7,896,510 bbl. daily of crude has been involved in price cuts representing a cash income loss of $892,100 daily. Increases—mostly in the nature of adjustments — involved 480,800 bbl. daily representing an income gain of $43,485.

The net cash loss to producers is estimated at $848,615 per day. Based on a daily average production for the period of 6,790,000 bbl., this gives the price cut on an average barrel of 12.5 cents.

The price changes have been coming fast and furious since mid-January

How Price Cuts Have Affected the Nation's Crude Supply

Every oil producing region in the nation except East Texas has felt the pinch of price cuts over the last 17 months. Some have been hit twice.

There have been a few increases in postings, but they either involved small volumes or were minor adjustments following cuts. Their effect has been negligible.

As a result, producers have now lost at least half of the 25-cent increase which followed the Suez crisis. The table shows what has happened since prices settled down in the months after Suez.

Crude Price Changes Since October 1, 1957

	Reductions		Increases	
	Volume* (Bbl. daily)	Value (Dollars daily)	Volume* (Bbl. daily)	Value (Dollars daily)
Texas	2,359,800	251,584	30,700	3,375
North and West Central	298,050	21,452	14,500	1,160
Gulf and South	589,500	75,713	16,200	2,215
East	650	163	0	0
Panhandle	38,700	4,728	0	0
West (Sour)	595,600	91,090	0	0
West (Sweet)	837,300	58,438	0	0
Louisiana†	759,510	96,223	42,000	3,150
Alabama-Mississippi	22,000	2,065	0	0
Oklahoma	698,000	75,762	303,500	26,035
Southern	151,700	15,170	0	0
Sweet	546,300	60,592	303,500	26,035
Kansas	459,100	42,969	74,600	6,425
Illinois Basin	305,000	45,750	0	0
Michigan	25,000	5,500	0	0
S. E. New Mexico	273,400	32,135	0	0
Sour	162,450	24,368	0	0
Sweet	110,950	7,767	0	0
Arkansas	139,800	14,155	0	0
Rocky Mountains	364,210	31,170	0	0
North Dakota	42,000	8,250	0	0
Four Corners	69,700	10,445	0	0
Ohio (Not Penn Grade)	12,000	1,992	0	0
Penn Grade	70,000	26,500	30,000	4,500
California	2,297,000	247,600	0	0
Totals	**7,896,510**	**892,100**	**480,800**	**43,485**

*Volumes for some crudes counted more than once because of multiple price changes. †Includes some Mississippi crude.

(see p. 73) and further adjustments in a few areas are still indicated before the cycle is completed.

Cuts since January 20 have centered in Texas and California. Texas crude totaling 1,084,400 bbl. daily was cut an average 10.24 cents a barrel. The loss to producers in that period of time was $111,055 daily, from cuts in West, West Central, North Texas and the Panhandle.

California producers also sustained an average 4-cent per barrel cut on 355,000 bbl. for a $14,200 daily loss.

Total cuts averaged 8.66 cents a barrel on 1,761,300 bbl. daily for an income loss of $152,564 daily.

Indications are that other purchasers may reduce prices in North Texas where a double price schedule now exists. The same may be true in Oklahoma and Kansas where producers face two basic price structures—$3.05 and $3.08 a barrel tops—plus at least three different gravity differentials.

Indiana Oil Purchasing Co. only last week switched its Oklahoma purchases from the $3.08 top with a straight 2-cent differential to a $3.05 top with a 3-cent differential on gravities below 36°. It also adjusted its Kansas schedule to a $3.05 top with a 2-cent differential. The cuts involved about 50,000 bbl. daily in Kansas and 28,000 bbl. daily in Oklahoma.

The Indiana adjustment could be the signal for other buyers now on the $3.08-top schedule in Kansas and Oklahoma to join the lower postings.

Texas hard hit . . . Texas producers are the hardest hit by price cuts over the last 17 months. California oil men are a close second.

Every Texas oil-producing area except the East Texas region is feeling the income pinch. The East Texas crude has maintained its $3.25 a barrel top price throughout. But producers in other Texas areas have sustained as many as two cuts. The loss is running to at least $248,209 daily from price changes involving 2,390,500 bbl. daily.

California producers have witnessed four separate price changes which eventually touched all types of crudes, and most of them twice. The cuts represent a loss to producers of $247,600 daily.

First California reduction came in April 1958 when an average 6 cents a barrel reduction was posted on 550,000 bbl. daily of crude below 27° gravity. In June a 14-cent a barrel cut was placed on 842,000 bbl. daily of all gravities below 40°. In September the 27°-gravity crude and below got another cut averaging 15 cents a barrel. And late in January an average 4-cent cut was posted on 355,000 bbl. of crude from 25°-gravity and up.

Net losses in other major oil areas include Louisiana $93,073 daily, Oklahoma $49,727 daily, Illinois basin

$45,750 daily, and Kansas $36,544 daily.

The foreign cuts . . . Price reductions in Venezuela and the Middle East started this month and quickly became general.

Shell touched off the Venezuelan cuts by posting reductions of 5 to 15 cents a barrel on 33 different crudes. Creole, International, Socony, Sinclair, and Mene Grande followed with similar reductions on their postings (OGJ, Feb. 16, p. 102).

British Petroleum, largest single crude supplier in the Persian Gulf area, started the price decline in the Middle East. BP announced an across-the-board cut of 18 cents a barrel on 1,244,000 bbl. daily of crude it controls in Kuwait, Iraq, Iran, and Qatar.

Esso Export last week met the lower prices in the Persian Gulf and Eastern Mediterranean. Esso's cuts ranged from 15 to 19 cents with the bulk getting an 18-cent cut.

The last general change in Middle East crudes came in mid-1957 when prices rose 13 cents a barrel. The current reductions represent the first general cut in Middle East postings since 1953.

The price decline was foreshadowed by several marketing deals which showed a price weakness. Japanese refiners reportedly were getting 10-cents a barrel discounts off posted prices for Saudi Arabian oil. Soviet Russia also was making spot deals at cut-rate prices in Japan, Latin America, and Western Europe.

Political implications . . . The political impact of the price cuts may well be the sleeper in the whole situation.

For both the Middle East and Venezuela, lower posted prices mean a decrease in revenue for the governments of the producing countries. In the face of delicate—almost precarious—political positions in both areas of the world, price cuts and lower revenue from oil at this time could set off chain reactions that would be difficult to stop.

Strangely enough, the two major producing areas of the world outside of the U.S. are at both ends of the scale in some respects.

In Venezuela, where Romulo Betancourt was inaugurated last week as the country's first democratically elected president in more than a decade, the official position is to hold production at its current level.

At the same time Venezuelans are crying for a bigger cut of the profits from the production of their oil. This came in the dramatic and overnight 10% increase in income taxes in December. This one still has oil companies poring at their balance sheets and crying foul.

Every Middle East oil producing country is swinging a two-edged sword at the oil companies operating there. Each urges and demands increased oil production to increase its revenue. This is in the face of the glut of oil on the world market which forced last week's price cuts.

At the same time, the Arab world is girding its forces to follow Venezuela's lead in demanding more cash from the profit of the oil operations it wants expanded continually in the face of softening crude markets.

The outlook . . . What happens now to oil prices depends on this set of confusing factors:

. . . Demand. If economic conditions at home and abroad pick up sufficiently to give world-wide demand a real lift, some of the slack can be taken out of oil oversupply.

. . . Pressure to hike production. The effect of any demand increase, however, can be lost quickly if various foreign or state governments, all anxious for more revenue, encourage heavy oil runs.

. . . Import controls in the U.S. If the pressure of foreign crude and products on the domestic market is stabilized, U.S. oil producers may count on prices holding.

Oil men are convinced of at least one fact: How oil prospers in 1959 now depends on whether present cuts are the end of a cycle or the beginning of another slide.

Newest Journal study shows . . .

Latest Crude-Price Changes

OIL producers in West Texas and Southwestern New Mexico have just experienced an expensive month.

Price cuts on their crude, exceeding 10 cents a barrel on the average, have chipped deeply into incomes.

Biggest reductions were in the prices for sour crudes of the two sections, where buyers posted cuts averaging 15 cents a barrel. The sweet-crude price reductions averaged 7 cents.

Cost of all the announced price changes to Texas producers during the month's time is estimated at $111,055 daily from cuts averaging 10.24 cents per barrel on 1,084,400 bbl. daily. The New Mexico loss was $20,225 daily from cuts averaging 10.74 cents on 188,400 bbl. daily.

Other cuts were 3 cents a barrel in Oklahoma and Kansas, 8.55 cents a barrel average in the Rockies, and 4 cents a barrel in California (see tab'e).

The Journal estimates that the cuts in all areas since mid-January averaged 8.66 cents a barrel and involved 1,761,300 bbl. daily of purchases. Total loss was $152,564 daily.

This is the fourth periodic study of prices made by the Journal. The others revealed:

. . . Average 13.10-cent a barrel cut from October 1, 1957 to April 25, 1958, involving 1,944,700 bbl. daily. Income loss exceeded $250,000 daily (OGJ, Apr. 28, 1958, p. 53).

. . . Average 20.51-cent a barrel cut from April 25 to October 17, involving 2,260,470 bbl. daily. Income loss $463,000 daily. This was offset slightly by increases averaging 12.23 cents on 212,800 bbl. daily and boosting income by $26,015 daily (OGJ, Oct. 20, 1958, p. 47).

CRUDE-PRICE CHANGES

1-20-59 to 2-17-59

(Price Cuts)

	Barrels per day	Dollars per day	*Avg. cents per bbl.
Texas	1,084,400	111,055	10.24
West (sour)	414,100	62,115	15.00
West (swt.)	498,850	34,919	7.00
West Central	113,750	7,963	7.00
North	19,000	1,330	7.00
Panhandle	38,700	4,728	12.22
S.E. New Mexico	188,400	20,225	10.74
Sweet	100,450	7,032	7.00
Sour	87,950	13,193	15.00
Oklahoma	28,000	840	3.00
Kansas	50,000	1,500	3.00
Rocky Mtn.	55,500	4,744	8.55
Colorado	29,300	2,930	10.00
Montana	2,200	134	6.09
Wyoming	24,000	1,680	7.00
California	355,000	14,200	4.00
Total Cuts	**1,761,300**	**152,564**	**8.66**
(Price Increase)			
Penn Grade	30,000	4,500	15.00

*Averages calculated from volumes cut, not total production.

. . . Average 8.75-cent a barrel cut from October 17 to January 23, 1959, involving 1,282,050 bbl. daily. The loss was $112,188 daily. Offsetting increases averaged 6.52 cents on 268,000 bbl. daily for added income of $17,470 daily (OGJ, Jan. 26, p. 102).

Imports Decision Due

. . . this week as voluntary program expires. There is some strong talk for mandatory controls of flow of imports.

THE EISENHOWER administration will adopt a new policy on oil imports this week.

Voluntary controls, which have been in effect in various forms since mid-1957, will expire automatically unless new or extended controls are imposed by the February 28 deadline.

Spokesmen for the cabinet fuels committee, which serves as presidential advisor on oil imports, have indicated repeatedly that a new import program will be ready to go into effect March 1. They are confident that the committee can accomplish in the next 6 days what it has failed to do in the past 5 months.

Interior Sec. Fred A. Seaton, a member of the committee, indicated at a news conference last week that agreement had not been reached on a new import program. "Every effort" was being made to accomplish the task, he said.

Actually, the committee and President Eisenhower may have no more than 24 hours to agree on new import restrictions before existing voluntary controls are lifted. The current study by the Office of Civil and Defense Mobilization, to determine imported oil's effect on our national security, will not be completed until February 27 at the earliest. Final decision by the cabinet committee will depend on the OCDM finding.

The new import policy might involve any of several alternatives:

. . . **No controls.** This route is considered unlikely. However, if the OCDM happened to rule that oil imports are not a security threat, import curbs would not be enforceable under the foreign-trade law.

. . . **Voluntary plan.** If the present program is extended it likely will be for only a short period to permit more time to work out and put into effect more stringent regulations.

. . . **Mandatory program.** Representatives of the major importing companies and independent producers who have discussed the problem with the administration see this as the most likely approach. If adopted without advance notice, such a plan would disrupt operations of most major importers who have commitments for future shipments. Several companies have made plans for an immediate court challenge if mandatory controls are imposed.

Any new controls that may be adopted are likely to cover both crude and products, with the possible exception of asphalt and residual fuel. Several companies have urged such exceptions in comments submitted to OCDM Director Leo A. Hoegh.

The 25-day period for submitting evidence to OCDM ended February 22. Hoegh has indicated that rebuttal material has 5 days to make all such data a matter of record. Hoegh's decision is expected to be announced February 27.

Companies speak . . . Statements received by OCDM range all the way from pleas for mandatory controls on crude and all petroleum products to an argument for more—not less—imported oil.

Tidewater Oil Co., which frequently has exceeded its quota under voluntary import controls, contended that the present policy has endangered the national safety.

"The definition of 'national security' has been so broadened as to make the term meaningless in relation to the safety of the nation," Tidewater charged.

"A preponderance of the evidence indicates the increasing inadequacy of this nation's oil resources and points clearly to the wisdom of and need for using increasing amounts of foreign oil."

Eugene M. Locke, president of Texas Independent producers and Royalty Owners Association, urged a mandatory program "which substantially reduces the level of all oil imports and tends to equalize economic advantage."

A mandatory program limiting imports to their 1954 relationship to domestic production was recommended by the Independent Petroleum Association of America. Under this formula, crude and products imports would be limited to about 1,250,000 bbl. daily. Imports during the last 6 months of 1958 averaged about 1,721,000 bbl. daily. In January they averaged close to 2,000,000 bbl. per day.

Lester Clark, chairman of the liaison committee representing a number of producer associations, also urged a mandatory control program which would tend to "equalize the economic advantage importing companies have over domestic producers."

OCDM was cautioned by Ingram Oil & Refining Co., not to "stampede under pressure."

"The oil imports position does not constitute a national security emergency requiring rush action," Ingram stated. "It is a long-range problem that requires an enduring solution."

Ingram suggested that imports from "dependable sources of supply" in the Western Hemisphere be given preference over those from the Middle and Far East.

Late last week, OCDM had received 48 statements from companies and individuals responding to the invitation to submit evidence for the security study.

Carson seeks data . . . While the OCDM study was being made, Capt. Matthew Carson Jr., administrator of the voluntary program, gave another hint that new controls may be based partly on historical imports.

He sent letters to about 165 present and prospective importers seeking detailed data on their foreign oil receipts since 1950. He hopes to have the records available by the middle of this week.

"If a program of controls is found necessary," Carson explained, "imports of crude oil and such derivatives during some base period to be determined may be a consideration in the granting of allocations to eligible importers."

Gulf May Sell

its holdings in Citronelle to a group of independents.

GULF OIL CORP. reportedly is negotiating with a group of independent oil operators to sell all its interests in Citronelle, Alabama's principal oil field.

Gulf executives withheld comment last week on published reports out of Mobile that it was negotiating. Trade sources, however, reported that talks on the deal are in final stages.

The independents are seeking to buy Gulf's 48 producing oil wells and all others in which Gulf holds part interest. Price reportedly has been settled and talks are now continuing in an attempt to dispose of oil in storage and set a date for property transfer.

Gulf is the biggest producer in Citronelle and buys the field's entire crude production of about 12,500 bbl. daily. Gulf, however, recently has been prorating its Citronelle purchases.

Citronelle produces about 80% of Alabama's total crude output. Its discovery in 1955 set off the greatest oil boom in Alabama history. The field,

however, has proved a disappointment. Although reserves are estimated at about 150 million barrels, operators now know it will be tough to produce them under presently known methods.

The oil-bearing Rodessa sands at Citronelle are tight and unpredictable. Bottom-hole pressure over the field dropped sharply as drilling proceeded. It wasn't long before production fell off, too.

These factors, plus the $250,000 price tag for the 11,000-plus-ft. wells, caused development to lag and prevented the field from being fully defined or developed.

New Highway Plan

offered by API urges use of general tax revenues.

HIGHWAY USERS shouldn't be left holding the bag when it comes to paying for an increasingly costly highway system.

In a new policy statement on highway financing, the American Petroleum Institute last week urged that "a reasonable part of highway costs" be met out of general tax revenues, since good highways benefit every citizen in many ways.

The API also criticized the use of highway-user taxes for non-highway purposes. The federal Government would have adequate funds to finance the federal interstate system if all special federal taxes now paid by motor-vehicle owners were applied to road purposes, API pointed out.

Private and government agencies were asked to plan only essential projects and to hold costs to the minimum "consistent with sound economic planning and good engineering practices."

In only 2 years, the API said, the estimated cost of completing the interstate system has jumped by $12.5 billion to over $40 billion, an increase of 45%.

Other points in the new policy statement included:

...**Gasoline taxes,** both state and federal, have reached a level which is out of proportion to the levies imposed even on luxury items. At the beginning of this year, gasoline taxes averaged 9 cents per gallon, more than 40% of the average retail price of regular-grade gasoline. To increase this burden would be unjustified.

...**The 41,000 miles** now authorized in the federal interstate system should be completed before any consideration is given to expansion.

...**The states** and their local subdivisions should continue to have primary responsibility for planning, building, and operating our highways.

watching WASHINGTON

Joe Reilly

• House looks for way to sidestep gasoline tax

MOUNTING OPPOSITION to a gasoline-tax increase has started a serious search by Congress for another means to keep the big federal highway program on schedule.

Rep. Wilbur Mills (D-Ark.), chairman of the House ways and means committee, said last week that he didn't see "any tax increases in the picture" for this year. Speaker Sam Rayburn (D-Tex.) had given his personal kiss of death to President Eisenhower's proposal earlier when he predicted rather knowingly that it was unlikely to get much support in the House.

Rejecting the proposed 50% tax increase doesn't solve the problem for Congress. The highway-building program was estimated to cost about $27.6 billion. Now the cost is placed at about $40 billion. The increase is due partly to inflation. Extension of the program and design changes also have added to the eventual cost.

The 13-year construction program, now in its third year, will be disrupted in mid-1960 unless more funds are voted. After a 1-year curtailment, the program then could resume at a reduced rate.

AT LEAST ONE ALTERNATIVE TO A TAX INCREASE, which would prevent a construction lag, is now being considered by the House ways and means committee.

A bill by Rep. Robert H. Michel (R-Ill.) would avoid the threatened deficit in the highway trust fund merely by juggling revenue. The measure, H.R. 4389, would earmark for the highway fund all present federal excise taxes on automobiles, trucks, buses, trailers, and parts and accessories.

Much of these "highway-user taxes" now goes into the general fund for nonhighway spending. Michel estimates that his bill would transfer about $1.5 billion a year into the highway fund. That's slightly more than the anticipated revenue from the 1.5-cent tax increase which Eisenhower is counting on to balance the budget.

At the end of 1958 the highway trust fund had a balance of about $526 million. That is rapidly being exhausted as the slow-starting construction program moves into high gear.

Since the program started, more than $4.2 billion has been spent from the federal highway fund. Collections total more than $4.7 billion, leaving a slight cushion.

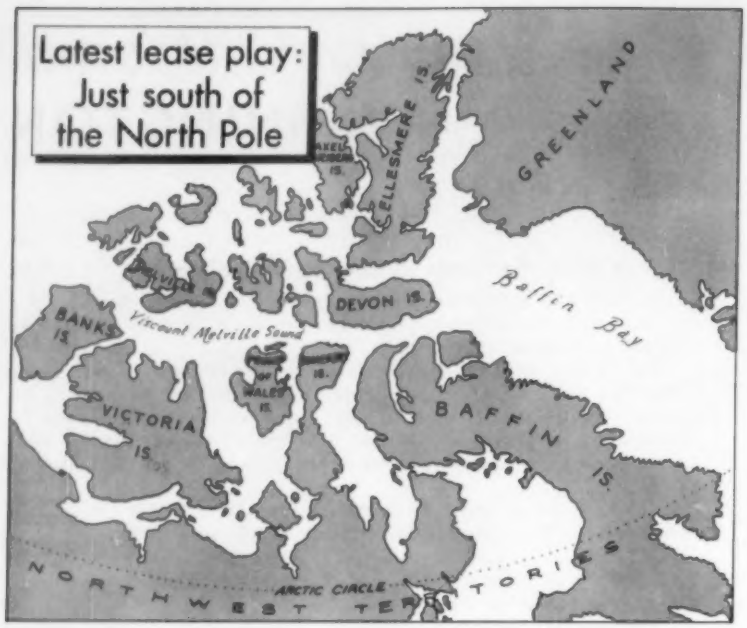
But collections have remained about steady while construction and costs have risen sharply. During the second half of 1958, for instance, expenditures totaled about $1.6 billion, almost double the amount spent in the same period a year earlier. For the last 6 months of 1958, expenditures were more than $500 million greater than receipts.

There has been little serious thought given to slowing the building pace. Any move in that direction is offset by the recent increase in unemployment.

MICHEL'S BILL STANDS TO GAIN SOME SUPPORT both from those who oppose deficit financing and those who will not go along with a tax boost.

He has some good arguments in favor of his solution. Federal and state gasoline taxes now average about 9 cents per gallon. This, says Michel, is an increase of a little over 6 cents in the past decade. The average tax, he says, already amounts to 80% of the refinery price of gasoline.

Michel's bill would leave a deficit in the general fund. But by the time Congress goes home a $1.5 billion deficit will look pretty small. Michel's solution would give the Democrats a chance to prove that Ike's budget was out of balance from the start.



Arctic Islands Leased

. . . in rush for oil and gas rights. Price of 5 cents an acre stimulates play for barren Canadian north acreage.

THE RUSH for oil and natural-gas rights in the Arctic Archipelago in recent weeks is seen as an "insurance" measure on the part of oil companies.

The firms have been applying for development rights on huge chunks of acreage in the Arctic islands—some of it within a few hundred miles of the North Pole.

The "premiums" are cheap—only 5 cents an acre—and assure the companies of being in on the ground floor when the opportune time comes to start active development.

Right now, the firms are merely staking out their rights in the archipelago. Development faces a number of formidable obstacles, and several years of geological research likely will precede any drilling.

Why the play . . . Canadian Northern Affairs Department officials say the rush has been building up ever since aerial geological surveys indicated oil and natural gas might lie below the remote islands.

The Geological Survey of Canada has completed a survey of 120,000 sq. miles of the Queen Elizabeth Islands —the northern part of the archipelago.

In addition to favorable geological reports on the sedimentary strata underlying ice, snow, and Arctic waters, the Canadian Government is amending its oil and gas exploration regulations for the northern areas. Proposed changes include doubling the time allowed for required work—5 cents per acre spent in the first 3 years instead of 18 months, and 25 cents per acre spent in the second 3 years instead of 18 months—and no limit on the size of the holdings.

Size of play . . . There are more than 200 million acres open for oil and gas exploration between the Distant Early Warning radar line along the Arctic Coast and the North Pole.

In 4 weeks, 52 million acres of that were optioned to 10 companies and syndicates. The buying became more frantic last week with three firms taking 20 million acres.

The optioned land extends right across the Canadian Arctic. The area covered is between Baffin and Ellsmere Islands on the east, Banks Island on the west, Somerset Island to the south, and a point on Ellsmere Island on the north.

The most northerly filing is only 700 miles south of the North Pole, almost bordering on what is called the permanent polar ice line.

Islands which have been filed on include Banks, Melville, Bathurst, Ellef Ringnes, Amund Ringnes, Axel Heiberg, and Somerset.

Who is active . . . Action on the applications for permits is being held up pending the review and probable changes of government oil and gas regulations.

Included in those seeking the permits are Standard of California, about 8,000,000 acres, with the location not disclosed; Texaco Exploration Co., about 3,000,000 acres in the Banks, Melville, Cornwall, Graham, and Buckingham Islands; Dome Petroleum Co., about 1,500,000 acres on the islands of Ellef Ringnes, Amund Ringnes, and Melville.

Talent Oils, Ltd., is reportedly in the play with applications for rights on 4,000,000 acres.

Heaviest bidder so far is a group of Calgary and Toronto-based companies. This group—formed of Round Valley Oil & Gas Co., subsidiary of Lobitos Oilfields, Ltd., a Dr. Bateman, who has connections with New Chamberlain Petroleums, and W. R. Newman, working for Joseph Hirschhorn interests—has filed on 13,000,000 acres in Belleville and Bathurst Islands.

Trans Western Oils, Ltd., has filed on 11,300,000 acres in the archipelago. The applications covered 1,330,000 acres on Banks Island, 2,274,000 acres on the west side of Melville Island, 1,402,000 acres on Eglington Island, 409,000 acres on Emerald Island, 2,632,000 acres on Mackenzie King Island, 1,745,000 acres on Borden Island, and 1,500,000 acres on the northwest portion of Bathhurst Island. About one-fifth of the total acreage is offshore.

Imperial Oil and Cree Oil Co. of Canada, Ltd., also are reportedly in the play.

Canadian capital, much of it thin, also has been thrown into the play, causing speculation that some of the smaller early birds are gambling on turning over their rights to some hungry late-comer at a tidy profit before 3 years expire and they have to put up more money to retain the rights.

It's a gamble because not a drop of oil has been found in the area. Development won't be quick. Unless somebody decides to try a long shot and drill into one of the salt domes without delay, years likely will be devoted to geological research before drilling is started.

The terrain is largely unexplored, the climate grim, the transportation distances and difficulties appalling, the engineering problems enormous, and prospective costs are staggering.

One oil man remarked, after optioning some 5,000,000 acres, that it will have to be as big a field as Saudi Arabia to make it a worthwhile investment.

The disadvantages apply almost equally to finding oil and to transporting it to markets at competitive prices. Oil men are talking about pipelines from the islands to Arctic seaports which tankers could reach during a few weeks each summer.

But the large companies have not leaped into the Arctic blindly. Some economic research preceded the move.

Other activities . . . The Arctic Islands rush is in addition to leases on 76,000,000 acres granted in the last 8 years in the Yukon and mainland of the Northwest Territories.

Texaco Canada, Ltd., has acquired 3,000,000 acres in the northern stretches of the Northwest Territories, touching on the Arctic Circle, bringing its total holdings there and in the Yukon to about 7,000,000 acres. Price for the acreage was not disclosed. Surface surveys will be started in early summer by field parties. The area is along the Anderson River, about 200 miles from the Mackenzie River, and can be reached only by air.

Areas farther south also are arousing interest. Richfield Oil Corp. has applied for an exploration permit on lands underlying the waters in the vicinity of Graham Island off the coast of British Columbia. Canadian Homestead Oils, Ltd., is seeking a permit for lands underlying the Fraser River delta. The two areas total about 500,000 acres.

Also, Hunting Technical & Exploration Services of Toronto has made a bid for a 25,000,000-acre permit in the Hudson Bay and James Bay areas.

Gas-Storage Tax Is Sought

A TAX on natural-gas underground storage has been recommended to the state legislature in Pennsylvania, the largest natural-gas storage state in the nation.

Designed to bring an estimated $3,500,000 to the general fund, the tax would amount to one-twelfth of 1 cent per M.c.f. each month. The recommendation was made by the governor's tax committee which is looking for ways to help pull the state out of its current deficit.

In 1958, storage capacity either in existence or planned in Pennsylvania totaled 535,388,000 M.c.f. This is more than one-fifth the nation's total.

Companies with storage in Pennsylvania include New York State Natural Gas Co., Texas Eastern Transmission Corp., Transcontinental Gas Pipe Line Co., Tennessee Gas Transmission Co., Equitable Gas Co., Manufacturers Light & Heat Co., United Natural Gas Co., Peoples Natural Gas Co., Pennsylvania Gas Co., and North Penn Gas Co.

Three Alaskan Tests Slated

. . . by Union and Ohio under pact approved by federal Government. Firms to spend $450,000 in 4-year period.

UNION OIL Co. and Ohio Oil Co. have agreed to drill three wildcats in Alaska under terms of a development contract covering about 229,000 acres.

Sec. of the Interior Fred A. Seaton announced approval of the 4-year contract last week.

The acreage is in the Knik Arm area off Cook Inlet northwest of Anchorage.

Union and Ohio originally sought an oil and gas development contract covering approximately 390,000 acres. About 75,000 acres of the area sought was eliminated because it is in the water-bottom area of Knik Arm and is subject to Alaskan jurisdiction under terms of the Statehood Act. An additional 86,000 acres which has been withdrawn as an Army antiaircraft artillery range also was eliminated.

The contract calls for the companies to spend at least $450,000 and drill three exploratory wells during the 4-year period.

Second pact . . . It is the second development contract covering a large block of acreage in Alaska to be approved by the Interior Department this year.

Early in January, Richfield Oil Corp. was granted exploration rights on about 490,000 acres in the Katalla-Yakataga area in southeast Alaska.

Seaton approved the Union-Ohio contract after the U. S. Geological Survey reported further exploration in the area was unlikely unless operating rights could be obtained on a large block of leases which would warrant a big investment.

Union and Ohio now hold 94,878 acres in the area under federal leases, lease applications, and options. They have indicated they can obtain leasehold or operating rights on the remaining acreage.

Lands under the development contract are exempt from the acreage limitations on federal oil and gas leases. Regulations provide that no person or company can hold more than a total of 100,000 acres in Alaska.

Shell Abandons Craft Fight

. . . to reach union contract agreement. Three refineries in Texas, Oklahoma, and Minnesota still strike-bound.

SHELL OIL Co.'s 175,000-bbl. refinery at Wood River, Ill., is back on stream following settlement of a 14-day-old strike.

Labor strife continued last week on three other fronts, however. Gulf Oil Corp.'s 275,000-bbl. Port Arthur, Tex., plant, Great Northern Oil Co.'s 27,500-bbl. refinery at Pine Bend, Minn., and Phillips Petroleum Co.'s 19,000-bbl. refinery at Okmulgee, Okla., still are shut down. The plants were being picketed by members of the Oil, Chemical and Atomic Workers Union.

Shell's strike ended with a contract agreement reached by 11 independent unions and refinery management. Settlement came 84 hours after C. K. Call, federal conciliation commissioner, entered negotiations.

The controversy had centered on work assignment issue.

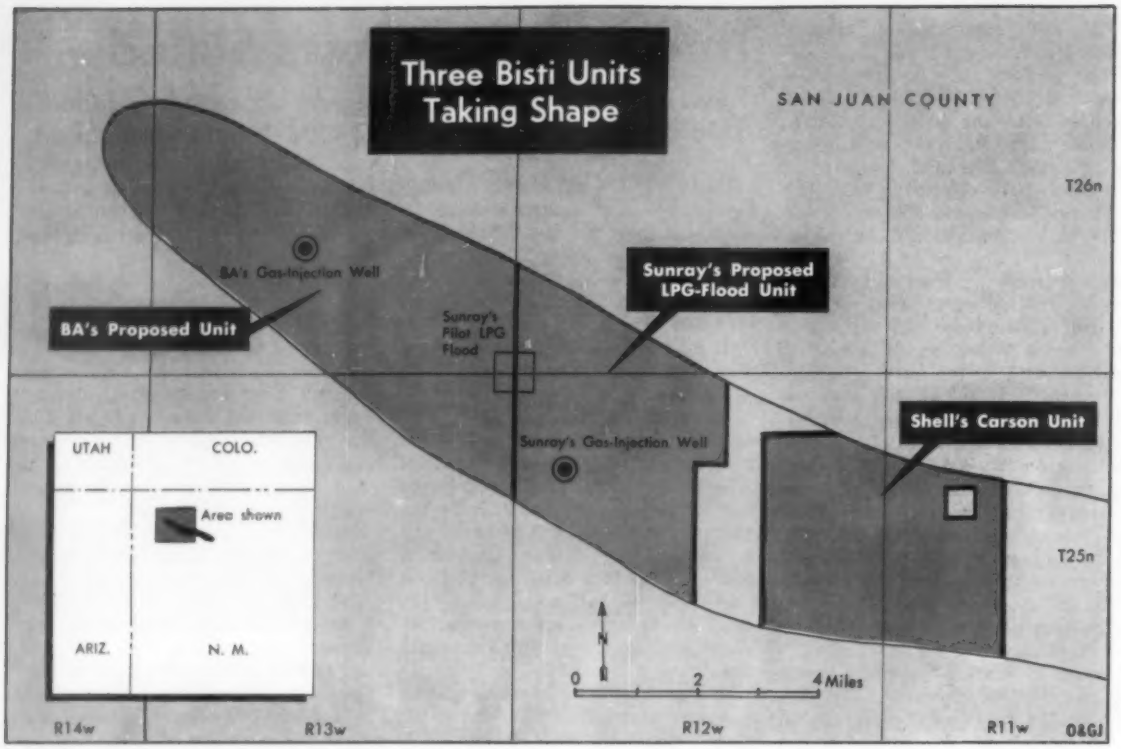
Under the new contract, retroactive to January 16, the company abandoned its plan to set up a crafts pool for assignment of workers. The contract provided for a 5% wage increase.

The new pact is in effect until May 1, 1960. It has a once-only wage reopener clause, not to be used for 6 months from effective date of the contract.

P. G. Merkus, refinery superintendent, said the contract spells out terms of work assignments to members of the 11 unions, making it clear to both sides what can be expected of each. He said it does not materially change practices prevailing for many years at the plant.

The Gulf strike also involves the craft lines issue. The Phillips walkout by about 125 OCAW members followed breakdown of talks centering on reduction of the work force at the refinery. The 5% wage settlement is the industry pattern, and wages are not an issue in the strikes.

The OCAW reports about 90% of its members are now covered by closed-out contracts, and no further strikes are considered imminent.



Busy Days Ahead for Bisti Operators

• Falling pressure sparks unit plans, but operators can't agree on method of recovery. Sunray estimates oil in place at 200,000,000 bbl., says LPG is best route, while Shell and BA lean toward water flood.

A DRIVE to unitize much of Bisti's 24,000 acres and get secondary-recovery operations under way is on in earnest.

Prospects now are that the northwestern part of Northwest New Mexico's biggest oil field will be split into three units operated by British-American Oil Producing Co., Sunray Mid-Continent Oil Co., and Shell Oil Co.

The unitized area would encompass more than half of the 30-mile-long field and perhaps two-thirds of its 277 producing wells. Unitization likely is in the cards for the southeast part of the field, too, but not so quickly.

Secondary recovery will follow hard on the heels of successful unitization in the northwest. Bisti operators agree among themselves this far. But opinions differ as to the best secondary method.

Some favor water flooding, others a miscible drive of the LPG-slug type. It appears possible now that the type of project may vary from one unit to another.

Operators are faced with the necessity of making up their minds on this score quickly. Bottom-hole pressure in northwestern Bisti already has fallen below the saturation level and will continue to decline rapidly. Further decline in pressure won't affect water-flood prospects greatly but will make a miscible project progressively less attractive.

Unit progress . . . One unit already is in effect in the field.

This is Shell's Carson unit in the middle of the field. It is felt likely that Shell will either enlarge this unit or form another adjoining it. Shell operates a number of wells immediately west of the unit.

The remaining acreage in the field to the northwest, including about half of the field's wells, will be split into two units of about equal size operated by BA and Sunray.

In accordance with this plan, the general operators' committee for the entire area was split into two committees conforming to projected unit boundaries—one operated by BA, the other by Sunray.

A cooperative agreement is being drawn by the two operators' committees whereby water would be injected along the boundary line to isolate the two prospective units.

Operators in the Sunray area already have agreed on a participation formula, flanged up a tentative unit agreement, and have submitted it to the U. S. Geological Survey for preliminary approval. USGS enters the picture because most of the leases in the area are on federal lands.

Operators in the BA area aren't so far along.

How much oil? . . . Sunray, one of the largest operators in the field, estimates oil in place in Gallup pay in Bisti at about 200,000,000 bbl.

Its engineering estimates place the amount of oil recoverable from the field by primary operations at possibly 30,000,000 bbl., or 15% of that orig-

inally in place. Secondary operations would boost ultimate recovery to as high as 40 or 50% of original oil in place, Sunray estimates.

Sunray, while realizing that not all the field is susceptible to LPG flooding, is solidly in favor of miscible drive, especially for the fairway. The company bases its thinking on performance of a 40-acre pilot project.

The Sunray pilot involves four producing wells, each drilled on 40 acres, with an input well in the center. The four wells have produced well over 200,000 bbl. of oil since the first of 31,000 bbl. of LPG was injected in August 1957.

Other operators, including a large acreage holder and participant in the project, feel Sunray's interpretation of results of the test is overly optimistic.

The Sunray estimate reportedly was based on a premise that essentially all oil recovered by the four producing wells in the pilot could be attributed as coming from the 40 acres fenced by these wells.

The premise was that oil drained to the producing wells in the pilot from outside the 40 acres was counterbalanced by oil forced out of the 40 acres between the producing wells.

A dissenting operator thinks only about 65% of the oil produced by the pilot should be attributed as coming from the 40 acres.

This operator's estimates of both primary recovery and secondary recovery via an LPG drive are far under Sunray's. The company feels that estimated average primary take over the field will not exceed 10.3% of original oil.

It agrees that the miscible drive appears to be the best physical performer of the various possible secondary methods. But, even so, the company estimates that a miscible project would not add more than 20.5% of original oil—for a 30.8% total yield from the field compared to Sunray's estimated 40 to 50% of in-place oil.

Methods may vary . . . There is little unanimity among northwestern Bisti's big three—Sunray, BA, and Shell—on the question of the best secondary-recovery method for the field.

Preference currently appears to stack up this way:

Sunray strongly favors miscible drive. Shell appears definitely sold on water flooding. BA is as yet undecided but leaning a bit toward water flooding if a suitable source of injection water can be developed.

BA engineers think that the Gallup pay, found at about 4,800 to 5,000 ft., should respond well to flooding. They estimate a water flood would recover only about 4% less oil than the miscible drive.

LPG required for a field-wide miscible drive would cost millions of dollars (LPG for the pilot cost $80,000). Also, such a project would postpone sale of produced gas.

These factors, BA feels, bring the two methods fairly close as to desirability for Bisti from an economic viewpoint and dictate a careful study of both before a decision can be made. An engineering group representing operators in the BA area now is making that study.

BA, as projected operator of what would be Bisti's most northwesterly unit, is considering three alternative injection plans:

. . . A triple line drive, with injection at both ends and in the middle of the unit.

. . . A peripheral program, with injection around the perimeter of the unit and production from fairway wells.

. . . A dispersed pattern.

All, it thinks, could most likely be adapted to injection of either water or LPG and gas.

More time sought . . . Both BA and Sunray have taken steps to slow dropping Bisti pressure and conserve gas until unitization can be completed and secondary drives launched.

Both have obtained approval of the New Mexico Oil Conservation Commission to reinject produced gas into the formation. Sunray has already begun injection in one well in the southwestern part of its proposed unit.

BA has a commission permit to reinject all produced gas in its area (about 1,500,000 cu. ft. daily) through its B-5 Douthit in Section 28-26n-13w. It is already installing compressors and gathering lines and plans to begin injection in early March.

The company asked the commission for approval of a plan to expand its gas-injection program later by adding three more input wells south and east of the B-5 Douthit.

Both Sunray and BA are negotiating provisional gas-purchase contracts with El Paso Natural Gas Co. El Paso would process the produced gas,

the JOURNAL *said . . . . . .*

50 years ago

February 20, 1909

A total of 41,101,000 bbl. of oil was produced in the Creek and Cherokee Indian Nations in the fiscal year ending June 30, 1908, compared to 21,717,000 bbl. the year before. U. S. Indian Agent Dana Kelsey said about 10,000 separate royalty accounts of tribal members received $1,685,675, more than total royalty and rental payments for all previous fiscal years.

The Texas Co. has purchased site for a warehouse, horse stables, and tankage space at Youkum, Tex. J. M. Young has been named local agent.

Associated Co. has struck the biggest gasser in California in its No. 3 Pacific Petroleum lease well near the Los Angeles city limits. At 2,000 ft., casing became stuck and it was shot with dynamite. Gravel, sand, and heavy mud were thrown over the derrick. The well was wild 4 days and the gas has shown no signs of exhaustion.

25 years ago

February 22, 1934

Talks on production problems in the Oklahoma City field and developments in oil field engineering are made to the API Production Division convention in Oklahoma City by H. O. Harder, ITIO, and C. E. Reistle, East Texas Producers Association.

Drastic regulations will be issued in Washington to enforce fair marketing codes if distributors continue to evade marketing rules, B. L. Majewski, Deep Rock Oil Corp., and Paul Hadlick, National Oil Marketers Association, warn Ohio Petroleum Marketing Association.

A total of 90,267 bbls. of Turner Valley crude was delivered to Calgary refineries in January, 10,000 bbls. above December.

The Federal Power Commission erred in saying he received a salary of $134,800 in 1928, A. F. Hockenbeamer, president of Pacific Gas & Electric, announced. He said his actual salary was $50,000.

10 years ago

February 24, 1949

Texas Supreme Court upholds Texas Railroad Commission order shutting down wells in Heyser fields of Victoria and Calhoun counties because of flaring gas. Fourteen other shutdown orders, affecting 26 fields, await hearings.

Report shows that of 94 million barrels of oil produced to date in Germany, 94% or 78,750,000 bbl. are derived from salt domes.

Contract is let for Magnolia Petroleum Co.'s natural-gasoline plant in Stephens Co., Okla. It will have capacity of 22 million cubic feet daily.

Middle East oil is being sold for lower prices in U. S. than in Europe, violating the Anti-Dumping Act of 1921, IPAA Attorney Dan Jones tells Senate foreign-relations committee.

return any residue gas needed for secondary recovery, and purchase the remainder.

Most of the gas which will be injected is now being flared. From the Sunray standpoint, its injection now will in effect bank gas which will be badly needed later for miscible drive. It will also conserve valuable pounds of pressure.

Present reservoir pressure is now about 1,000 psi., well below the saturation level of about 1,140 psi. It is generally felt that as pressure falls further below the saturation level, miscible drives become less attractive, due partly to the presence of more and more free gas in the pay zone.

From its program, BA will gain time to decide on its recovery method and also derive the same benefit as Sunray if it should choose a miscible program.

Spacing and flaring . . . While the need for haste in unitization still presses on Bisti operators, problems connected with well spacing and gas flaring in the field have eased.

Shell Oil Co., at least for now, has dropped its fight to swing the 3-year-old field back from its present 80-acre spacing pattern to one based on 40 acres.

At a hearing in January, the New Mexico commission approved a 1-year extension of its temporary 80-acre order on agreement of all field operators to such action. The 80-acre pattern will continue indefinitely after January 1960 unless further hearings are requested.

Gas flaring, too, will soon be a problem of the past. About 10,000 M.c.f. of gas daily is being flared. Bisti operators were called to account by the commission at a hearing in December. The commission deferred action and continued the hearing to March 18 on evidence by operators that essentially all produced gas would be legally used, either by sale or reinjection, by that date. Indications are that the deadline will be met.

Though volumes of produced gas from Bisti's Gallup pay are relatively small now, they are bound to increase sharply in the near future. Operators now all agree that the reservoir drive is solution gas. In such a pool, gas production shoots up rapidly as pressure continues to fall below the bubble point.

Gas-oil ratios in Bisti still are fairly low, averaging around 750:1. Since field pressure fell below the bubble point, however, they are trending upward. And the rise should soon become pronounced.

This is still another reason for operator haste in the push for unitization.

Uncle Sam Playing It Cozy

. . . in filing initial installment of price-fixing bill of particulars. Indicted oil companies still in the dark.

THE GOVERNMENT, under federal court order to spell out in more detail its charge of price fixing against 29 oil companies, last week filed a preliminary bill of particulars—which didn't get very particular.

An attorney for one of the indicted firms gave the one-page bill of particulars a fast reading and observed:

"It doesn't tell us anything the Government hadn't already told us at the last hearing. It doesn't amount to anything."

The attorney pointed out, however, that the Government is not in default of the court order because March 16 is the final deadline to detail various points of the indictment.

After that, if defense attorneys think the Government's particulars still are too vague, they can go before U. S. District Judge Royce H. Savage in Tulsa and maintain Uncle Sam didn't comply with his order.

Judge Savage ruled last month that the indicted firms had a right to know more about the charge that they conspired to raise and fix prices of gasoline and crude oil during January 1957 (OGJ, Jan. 19, p. 67).

The judge upheld a defense motion requiring the Justice Department identify persons accused of being coconspirators and name the dates each company entered into the alleged conspiracy.

In its preliminary bill of particulars, the Government states: "The Government does not at this time know the names of any persons, firms, or corporations other than the defendants who participated in the alleged combination and conspiracy. Its knowledge and information with respect to this particular is incomplete."

The companies also had sought to find out just what gasoline prices the Justice Department is claiming were fixed and what gasoline markets were supposed to be involved.

The Government, in its particulars, replied it means all grades of automotive gasoline sold by the indicted firms "at all stages and levels of distribution." It added that it also means all grades of crude oil purchased or sold by the firms.

Questions unanswered . . . Defense lawyers are waiting for the Government's final bill of particulars to see if it answers various points raised in the motion.

For one thing, they want to know who is supposed to have done all this conspiring.

The defense also wants to know what areas will be covered in evidence to be submitted by the prosecution during the trial. The lawyers think the wording of the indictment along this line is a bit general. It charges the companies conspired to raise and fix prices "throughout the affected market"—which includes the District of Columbia and all states except California, Oregon, Washington, Nevada, and Arizona.

PIPELINE BRIEFS . . .

A 68-mile, 8-in. products line connecting the LaGloria Oil & Gas refinery at Tyler, Tex., with Texas Eastern's Little Big Inch system at Carthage, Tex., will be started next month. Contract has been awarded to O. R. Burden, Tulsa. LaGloria is a Texas Eastern affiliate. A 500-hp. pump station will be built at Tyler by Brown & Root, Inc., Houston.

A large electric motor to power a centrifugal compressor has been installed in Transcontinental Gas Pipeline's new station at Grover, N. C. Made by General Electric, the 12,500-hp. synchronous motor drives the compressor through a single ratio, double helical, precision-type gear. The motor operates at 900 r.p.m. at 4,000 volts, unity power factor, and is force-ventilated. The gear is rated at 900/4,820 r.p.m.

Contract for 12 miles of 10-in. and 58 miles of 12-in. gas line in Oklahoma has been awarded to O. R. Burden. The line will be laid from Cherokee to Ponca City for Northern Oklahoma Gas Co., which has budgeted $2,500,000 for the project. Fields in Grant and Alfalfa counties will supply the system, which will be completed in May.

Canada's loss of U. S. export markets is reflected in the big drop in crude throughput of Trans Mountain pipeline during 1958. The average was 81,000 bbl. per day against

Drilling to Pick Up

in Michigan as result of new 20-acre spacing order.

DEVELOPMENT of Michigan's Pulaski and Albion fields is expected to gather steam now that the State Department of Conservation has fixed spacing regulations.

The department set a 20-acre spacing pattern after public hearings earlier this month.

The new ruling will create at least 10 drilling locations in Albion and Pulaski. Albion currently has one producer, one ready for completion, and several wells drilling. Pulaski, newest southern Michigan field, has one producer and several locations. Activity has been slow because of uncertainty over spacing.

The ruling does not affect nearby Scipio field, which has been drilled on 20 acres. Discovery of Scipio, which now has 25 wells, was responsible for bringing Michigan oil activity to a pitch not seen since the 1930's.

Carter Oil had asked for 40-acre spacing in Pulaski and Albion, with Aurora Gasoline Co. and most independents holding out for the 20-acre pattern.

Heterogeneous nature of the reservoir was the main argument for 20-acre spacing. Structure is apparently secondary in the fields and production depends on spotting the dolomitized zones in the pay section.

One operator testified that a 20-acre offset to its best well came in dry. Some operators figure that if the second well on 40 acres will produce at least 8% more oil, it will pay for itself. Independents argued that the second well should pass this break-even figure easily. Carter challenged the 8% figure, saying that it would be closer to 25%.

Other actions pending . . . A proposed state unitization law has been drafted and is now being studied by operators. Hearings were held last week to get reactions to the proposed law.

The state board is also studying a suggestion from Aurora that Scipio gas-oil ratios be lowered from 1,400:1 to 667:1 (100,000 cu. ft. of gas to lift 150 bbl. of oil).

Adoption of this pressure maintenance ruling would bring problems in reworking some high gas-ratio wells, but operators seem generally agreed that present allowables of 200,000 cu. ft. per day per well are too high. Scipio is a gas cap field.

New Lube for Jets Developed

A NEW SYNTHETIC lubricant has been developed for use in supersonic high-performance aircraft.

Capable of withstanding temperatures of 400° F. for sustained periods, the lube oil removes one of the major obstacles in the development of supersonic jets. Present lubricants have a 300° F. limitation and are inadequate for use in some of the future high-performance planes.

The new lubricant consists of an ester-type base fluid containing selected additives. The base fluid was developed by Celanese Corp. of America. The Air Research and Development Command developed a silicon containing analogue of phenothiazine as the additive, for use as a high-temperature antioxidant.

The lubricant was developed at Wright Air Development Center, Ohio.

Price Fix Charged

before grand jury looking into Denver gasoline war.

A FEDERAL GRAND JURY last week delved into alleged price-fixing by oil companies operating in the Denver metropolitan area.

The probe, resulting from Denver's 4-month-old gasoline price war, was handled by three Justice Department antitrust lawyers from Chicago.

One member of the team, Ned Robertson, declined comment on reports the jury studied alleged attempts by major oil companies to force up the price of products sold by Bay Petroleum Corp. Until the start of the price war, Bay had sold gasoline 1 cent under the majors' price.

Twenty-five subpoenas were issued for the secret sessions, and oil companies were ordered to produce their records.

Although none of the witnesses was identified, three top oil company officials said they were called to testify. They were James W. Liddell, vice president of Continental Oil Co.; M. H. Robineau, president of Frontier Refining Co., and A. E. Pilkington, president of Pyramid Petroleum Co., distributor of Shamrock products in Denver.

Robertson said complaints of price-fixing were made by certain oil companies. He did not identify them.

An antitrust case against 29 oil companies charged with fixing prices of gasoline and crude oil is drawing near a trial in Tulsa. The Tulsa case is based on a rise in prices in 1957 (see related story p. 80).

154,000 bbl. per day in 1957. The company reported a net loss of $143,000 compared with a profit of $8,306,000 in 1957.

A 40-mile, 30-in. line will be laid by United Gas Pipe Line to expand its South Louisiana gathering system. Bids will be received this month.

Expanded facilities to take 80,000 M.c.f. daily from Laverne gas field in northwestern Oklahoma will be started next month by Michigan Wisconsin Pipe Line. Bids were received last week on the $48.7-million project, which includes 373 miles of 24-in. mainline loop, 21 miles of 16-in. loop, and 29,210 hp. of compression.

A $4,800,000 program to expand and update facilities will be undertaken this year by Northwestern Utilities, Edmonton. The company will expand main extensions, services, and meters to extend gas service to 5,500 new customers.

Also for Pipeliners . . .

IN THE NEWS: California oil men are objecting to new gas line, fear it will raise further havoc to dwindling fuel-oil markets (p. 82) . . . Gas will keep on taking markets from oil in the years ahead, speakers predict before AIME's San Francisco meeting (p. 84) . . . West Texas gasoline starts through Great Lakes Pipe Line when Cosden completes last link on its products system from Big Spring, Tex., to Duncan, Okla. (p. 87) . . . FPC examiner rejects 16-cent field price for New Mexico gas on grounds it would set off a general price increase (p. 90) . . . Pipeline projects loom big in plans of new Pemex boss to expand the government-owned company (p. 91) . . . A new 5-year development plan aims to funnel Venezuela's natural gas to the nation's urban centers (p. 92).

PLUS THESE TECHNICAL REPORTS: Laurel products line is the first to use 24-in. pipe (p. 115) . . . Pipeline construction report (p. 153).

Oil Men Object to California Gas Line

• With more fuel oil than they can sell, oil companies fear any further move to increase use of natural gas on the West Coast. Say the gas men: Smog control officials and gas users are demanding the flow of gas be increased.

EFFORT to bring additional out-of-state natural gas into the growing southern California market hit a snag last week in Los Angeles.

In an unprecedented move, California oil companies, through the Western Oil and Gas Association, paraded to the stand at a California Public Utilities Commission hearing to voice objections to a proposed 218-mile, 34-in. line from the California-Nevada border to the Los Angeles Basin.

The line, a joint project of Southern California Gas Co. and Southern Counties Gas Co., is programed to bring in 475,000,000 cu. ft. daily by 1964. Deliveries are slated to start in 1960 at a 200,000,000 cu. ft. daily rate.

Oil men labeled the project variously as "premature," an effort to secure a "captive market," and a plan to make Southern California a "one-fuel" economy.

The combination of unseasonably warm winters and restrictions on fuel-oil use imposed in the battle against smog, plus the tremendous growth of natural-gas imports, has raised havoc with fuel-oil usage in the West.

And the problem is worsened by the fact that California crude has a high fuel-oil content.

Speaking for the association at the hearing were: Felix Chappellet, vice president and general manager of WOGA; A. C. Rubel, president of Union Oil Co. of California; Richard R. Von Hagen, president of Lloyd Corp. and the Oil Producers Agency of California; and Donald Ostrom, acting manager of Standard Oil Co. of California's gas-utilization department.

Here's what they had to say about the line:

... Chappellet. The applications are not in the public interests and will result in higher costs for the users of gas and electricity.

Also of concern is the apparent failure of many people to understand the necessity for alternate fuel in the economy of Southern California and the rapid steps being taken to bring about a one-fuel (gas) economy.

... Ostrom. The importation of Rock Springs gas is premature. It would increase the cost of gas to residential and small business customers in order to make up a revenue deficiency of $146,765,000.

Gas company figures indicate that Rock Springs gas would not be required for firm customers for at least 5 years.

The development of additional underground storage is a more economical way of providing adequate gas supplies in the area.

... Von Hagen. Supplies of fuel oil will be greatly reduced if the gas companies succeed in obtaining a "captive market" under their restrictive schedules.

Fuel oil will not be available to meet sudden emergency requirements of electrical utilities and other industrial customers. The Rock Springs gas would be an expensive product.

The price of fuel oil is almost the same as 10 years ago while gas has nearly doubled. If the supply of fuel oil should disappear, the price of gas to industrial users would be increased still further.

Refiners are being forced to go to coking units and other expensive processes, which will reduce the availability of fuel oil in case of emergencies.

... Rubel. The gas companies are aiming at a "captive market" and are asking to import out-of-state gas in quantities greater than needed for firm customers and several years in advance of firm requirements.

The availability of out-of-state gas cannot be relied on. The gas companies should accelerate their underground storage expansion plans rather than seek out imports ahead of demand.

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In a squeeze . . . The gas companies pleaded they are caught in a squeeze.

W. M. Jacobs, vice president of Pacific Lighting Corp., parent company of the two gas utilities, told the commission examiner that smog officials and large industrial customers were on their back to make additional gas available.

He cited a recent Los Angeles County ban on fuel oil burning during the summer months as one reason for the immediate need for large supplies of gas for interruptible customers. He denied any alleged move to secure a "captive market" or trying to establish a "one-fuel" economy in Southern California.

As a matter of fact, a gas company spokesman said, several large industrial customers have announced plans to seek their own sources of gas supplies, charging the gas companies were either unwilling or unable to satisfy their gas demands.

Dismissal asked . . . Gerald Trautmann, attorney for the Western Oil and Gas Association, filed a motion to dismiss the gas companies' application on the grounds they had failed to offer "one bit of proof of economic feasibility of the Rock Springs project."

The pipeline under fire in California would connect with a line planned by El Paso Natural Gas Co. from Provo, Utah, to the California border south of Las Vegas.

This 400-mile line would in turn connect with a proposed 148-mile segment to be built by Colorado Interstate Gas Co. from Provo to Rock Springs, Wyo.

The original announcement of this over-all project (OGJ, Aug. 11, 1958, p. 66) said El Paso planned to take 200,000 M.c.f. daily from Pacific Northwest Pipeline Corp., 200,000 M.c.f. daily from Colorado Interstate and 150,000 M.c.f. daily from Savanna Creek field in Alberta.

A major part of this gas supply was originally part of the canceled Beatrice project of Colorado Interstate and Natural Gas Pipeline Co. for delivering 485,000 M.c.f. daily to Chicago.

The hearings are to resume March 25, at which time the commission will rule on the motion for dismissal.

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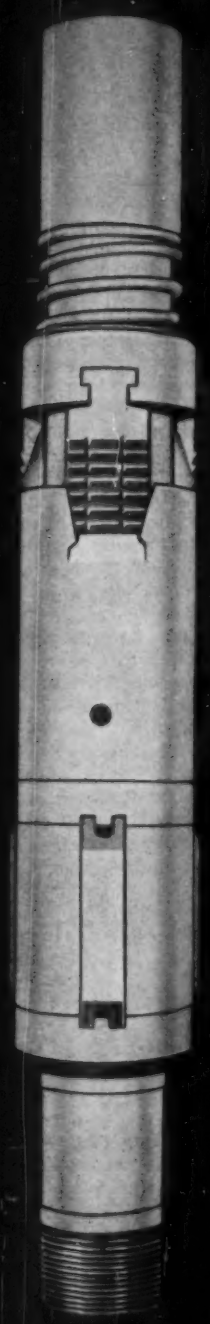

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Gas Will Keep Outstripping Oil Gains

• Demand for both will grow, but gas will keep taking oil's markets in the years ahead. In the past 11 years, one speaker tells AIME, the increase in gas demand has exceeded gain for domestic crude and all imports combined.

NATURAL GAS—once merely a byproduct of the search for oil—is rapidly becoming the tail that wags the petroleum dog.

As gas demand grows at a faster clip than oil demand, gas will cut still deeper into the energy market. Much of its gain will be at the expense of oil.

The growth of natural gas and its effect on the oil industry were cited last week in three papers before the Society of Petroleum Engineers, AIME, at the group's annual joint meeting in San Francisco.

Significance of natural gas in the present and the future energy picture was covered in a paper prepared by Warren Davis and J. L. Schweizer, Jr., Gulf Oil Corp., one presented by T. W. Phelps, manager of Socony Mobil Oil Co.'s economics department, and a paper written by Eugene Ayers, of Gulf.

Davis, Schweizer Views

Davis and Schweizer see natural gas as both a partner and competitor of oil producers.

Total U. S. energy requirements through 1970—barring a global war or major depression—will increase about 2.5% per year, they said. Projecting the 1920-58 trends, crude-oil demand will grow about 3% a year, increasing its share of the market from 42.4% in 1958 to 44.5% in 1970.

At the same time, natural gas, with an average growth rate of between 4 and 5%, will boost its percentage of the market from 26.7% to 30.5%. Coal's share will drop from 24.1% to 18.2% during that period.

Partner . . . Natural gas for many years has grown steadily as a source of revenue for the producer.

In 1922, the value of the gas at the wellhead was about $85 million. This was less than 9% of the total value of petroleum production. Gas revenue has grown faster than oil revenue. By 1958 the wellhead value of natural gas amounted to about $1,300 million, about 15% of the total value of petroleum production.

Competitor . . . Natural gas has made big gains primarily because of a price advantage.

Davis and Schweizer raise the question of whether natural gas is now more important to oil producers as a source of revenue or as a competitor.

"It is reasonably certain that if artificial control of gas prices continues," they said " the importance of gas as a competitor will grow much faster than its importance as a revenue source." They predict future demand gains, at the expense of oil and coal, similar to those of the past.

Since 1947, they said, gas consumption has increased more than the consumption of domestic crude oil and imports combined.

On a crude-oil-equivalent basis, gas consumption has increased 3.3 million barrels a day since 1947. By contrast, imports of both crude and products rose from nothing to 1.4 million barrels daily in 1958, and domestic crude gained only from 5.1 to 6.8 million barrels daily, a combined increase for domestic crude and imports of 3.1 million barrels.

This increased use of gas, coupled with its low price, has kept the average wellhead price of hydrocarbon energy at about the same level for the past 30 years. They termed this "shocking" in the face of sharp increases in the real costs of finding and developing oil and gas.

And unless natural-gas prices are freed from control and permitted to compete on the open market, oil must continue to compete with the underpriced gas for a portion of the energy market.

Phelps' Forecast

The oil industry in 1968 will be supplying a higher percentage of U. S. energy needs, but the increase will come through natural gas rather than crude oil, Phelps said.

He feels that the U. S. may be on the threshold of a new energy era, but economists, he said, must give less weight to trends and pay more attention to causes and effects.

The market . . . Of total 1968 energy needs, Phelps estimated that the petroleum industry will supply 72% (oil, 43% and natural gas, 29%).

Coal's share of the total market will decline to 24%, but he believes the tonnage of coal consumed each year will be higher then.

"Coal has already lost essentially all of its vulnerable home-heating and railroad markets. From here on, the demand for coal should increase by virtue of its strengthening position in generation of electricity, and its role in coke production."

PROCESSING BRIEFS . . .

Du Pont's sodium and chlorine unit at Memphis, Tenn., is now in operation, increasing the company's capacity for these chemicals by about 50%. The sodium will be used for basic metal in high-energy fuels, metal descaling, and chemical processing. Part of the chlorine will be used in the manufacture of titanium dioxide pigment at Du Pont's 45,000-ton plant nearing completion at New Johnsonville, Tenn.

Standard of Ohio has sold a half interest in its Lima, Ohio, petrochemical plant to Atlas Powder Co. The two have formed a new company, Solar Nitrogen Chemicals, Inc., to handle the petrochemical operations. Sohio Chemical Co., a wholly owned Ohio Standard subsidiary, will operate the plant. Edward F. Morrill, president of Sohio Chemical, is president of the new company and Edward J. Gett, executive vice president of Atlas, is vice president.

Sohio has been manufacturing and selling ammonia, nitrogen solutions, urea, nitric acid, and dry ice at Lima since 1955. Atlas is a large consumer of ammonia in its explosive and chemical operations.

The first large-scale commercial plant to produce boric oxide will be constructed at Trona, Calif., by American Potash & Chemical Corp. Completion of the $800,000 plant is slated late this year.

Two companies have been named

Petroleum's contribution to the nation's 1968 energy requirements will amount to 12,200,000 bbl. daily. Of this, 1,134,000 bbl. will come from natural gas and gas liquids. Domestic crude production will be 8,725,000 bbl., and imports of crude and products will total 2,641,000 bbl. daily.

A larger portion of the oil barrel will be used for transportation, for petrochemicals, and for other new uses for hydrocarbons, he forecast.

Natural-gas demand will increase at an average of 4.6% annually, as compared with the 3% gain for crude oil. The rate of growth during the second 5 years will be less than during the first 5 years. This will be particularly true, Phelps declared, if economic forces are permitted to determine the wellhead price for gas.

As to nuclear energy, Phelps estimated it would be supplying only 0.3% of the demand in 1958. This would be equivalent to a mere 300,000 bbl. of oil daily.

Ayers' Paper

Ayers' paper was a reappraisal of the 1952 Paley report, which forecast a 1975 demand of 13,500,000 bbl. for the United States and 27,000,000 bbl. for the free world. This now seems to be on the low side, he said.

"It now seems probable that United States demand in 1975 will be more than double U. S. production and that the rest of the free world will be dependent largely on Middle East production. If this comes to pass, we may expect use of oil to be almost exclusively limited to internal combustion and other similar unique applications. For mere BTU's, coal will be preferred."

Projecting 1947-57 trends to 1975, Ayers said it would result in about 17,000,000-bbl. demand for the U. S. and about 33,000,000 bbl. daily for the rest of the free world.

Noting that the Paley report recommended expanded petroleum imports —"in view of its future needs and limited resources, this nation should welcome crude imports, not place obstacles in their way"—Ayers said. Nothing has happened during the past decade which would suggest a change.

Little stress was placed on shale oil or conversion of coal to liquid. "This seems wise in view of the present indications that the rate of shale-oil production in 1975 can be relatively slight and that we do not have enough reserves of cheap coal to justify any considerable coal conversion," he said.

Gas too low . . . The projected United States demand for natural gas at a 4% increase annually was definitely too low, Ayers said. The president's material policy commission report had forecast a 1957 demand of 8.7 trillion cubic feet. Actual demand that year was 10.7 trillion cubic feet.

"Gas is such a convenient and desirable fuel for stationary heat and power applications, and its cost so relatively reasonable," he said, "that demand over the next decade or so probably will rise as rapidly as pipelines can be provided for distribution. "Additional pipelines, however, will be build only if return on investment seems attractive and secure."

Sun Oil to Expand

into new polypropylene field after forming joint company.

A THIRD PARTY is joining the polypropylene parade. Sun Oil Co. and American Viscose Corp. have teamed up for production of the polymer.

The companies have formed Avisun Corp., an equally owned affiliate, to produce and market polypropylene resins, film, and fibers. To make a quick entry into the market, Avisun has made a deal with Koppers Co., Inc., to modify existing facilities at the latter company's Port Reading, N. J., polyethylene plant.

Koppers will operate the plant under the technical direction of Avisun. Production is expected by midsummer at the leased facilities which will have a capacity of 20,000,000 lb. per year.

Other marketers . . . Avisun will be the second commercial marketer of the product in this country, following Hercules Powder Co., Inc., which began production late last year.

Humble Oil & Refining Co. has a 40,000,000-lb. plant under construction at Baytown, Tex., and expects to be in production early next year. Enjay Co., Inc., will market Humble's output, with some being sold to Spencer Chemical Co. under a sales agreement with Enjay.

Chalmer G. Kirkbride, executive director of research and engineering for Sun, has been elected president of Avisun.

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by American Petrofina to distribute Fina products in the Midwest. Colonial Petroleum Co., a marketing firm operating in Iowa, northern Missouri, and southwestern Wisconsin, was named a Fina jobber. American Petrofina also formed a new wholesale marketing firm, Colonial Oil Products Co.

A plant for calcining petroleum coke will be built near Purvis, Miss., by Kaiser Aluminum & Chemical. It will be constructed on a 20-acre site adjacent to the Purvis refinery of Pontiac Eastern Corp., which will supply the petroleum coke. The $500,000 plant will have a capacity for calcining 70,000 tons of coke per year.

Tidewater Oil is expanding its marketing holdings in the East with purchase of C. J. Styger Oil Co., Sussex, N. J. The purchase includes 60 service-station outlets, an inland bulk terminal, and about 120 commercial and farm accounts in northern New Jersey.

The Borden Commission, which is studying Canada's energy potential and needs, will submit its report on oil marketing in April or May. Prime Minister John Diefenbaker said the commission will suspend hearings until then. Hearings will probably be resumed after the report is released, possibly in the Maritimes.

Also for Refiners . . .

IN THE NEWS: Crude-price cuts in the last 17 months have trimmed an average 12.5 cents a barrel off the cost of crude to refiners (p. 71) . . . A decision of some sort will have to be made this week on a new imports-control program. The mandatory approach has some strong support (p. 74) . . . API urges use of general tax revenues without gas tax hike to help federal highway fund (p. 75) . . . Shell and union reach strike settlement at Wood River after company drops its fight to create craft pool for assignment of workers (p. 77) . . . Government fails to give many particulars in filing its first price-fixing bill of particulars (p. 80) . . . Federal grand jury in Denver is investigating charges of price fixing rising from a gasoline price war (p. 82) . . . Sun Oil is expanding into new polypropylene field in joint venture with American Viscose (p. 85) . . . Chemical-plant construction hits new high in 1958 (p. 90).

PLUS THIS TECHNICAL REPORT: WPRA refining quiz on catalytic reforming (p. 120).

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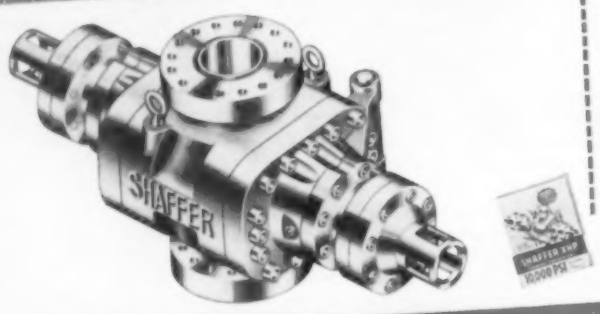

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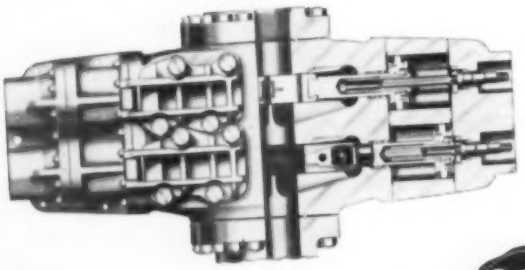

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OIL'S FIRST CENTURY: BORN IN FREEDOM WORKING FOR PROGRESS

New Products Line Paves Way

. . . for initial flow of West Texas gasoline through Great Lakes system. It is part of Cosden's market expansion.

WEST TEXAS gasoline will start flowing through the Great Lakes Pipe Line system for the first time this week.

Cosden Petroleum Corp. will make its first tender to Great Lakes through a products line which now extends from Big Spring, Tex., to Duncan, Okla. There the line connects with Oklahoma-Mississippi River Products line, which ties in with Great Lakes at Tulsa.

The 25,000-bbl. tender of regular gasoline, scheduled for February 26, will mark the beginning of competition between West Texas and Mid-Continent refiners in the area served by Great Lakes. It's also another step in Cosden's move to open new growth opportunities beyond the West Texas-New Mexico area to which it has been confined.

Cosden's market expansion . . . This latest move was made possible by construction of River Pipeline Co.'s 47-mile, 6-in. line from Wichita Falls, Tex., to Duncan.

This Cosden affiliate started up its line February 13 in formal dedication ceremonies attended by officials of Cosden, Oklahoma-Mississippi River, Great Lakes, and Texas Eastern Transmission Corp.

A year and a half ago Cosden built the Trust Pipe Line from Abilene to Wichita Falls to open North Texas to its interconnected Big Spring, Colorado City, and Hawley (Abilene) refineries. The company spent $2,550,000 on the 128-mile, 6-in. line to get into the Wichita Falls area market (OGJ, July 29, 1957, p. 109).

Initial design capacity of the Duncan line, with a 75-hp. pump at Wichita Falls, is over 7,500 bbl. daily. This can be doubled easily with more horsepower.

Cosden is the only shipper at this time but the Continental Oil Co. and American Petrofina, Inc., refineries at Wichita Falls are connected to River.

Reasons for move . . . Dissatisfied with being limited to the growth rate of the local West Texas-New Mexico area, Cosden started looking northward.

"We had filled up our local market," says Dan M. Krausse, senior vice president. "We were supplying all we could hope to supply through our own outlets and those of others. Our future growth, if it was to be greater than that of our local market, would have to be in other areas."

Cost studies convinced the company that West Texas gasoline could compete with Mid-Continent gasoline, and the new pipeline is the lowest-cost route to this market.

Cosden has been in the Great Lakes pipeline for several years with exchange product. But this week's tender will be the first Big Spring gasoline in the system. It will be sold to independent marketers and one major oil company. Cosden has none of its own outlets in the Mid-Continent.

Ohio Valley next? . . . The company is also a potential shipper on the Little Big Inch which reaches Chicago and the Ohio Valley through the interconnecting Oklahoma - Mississippi River line.

It's supplying customers in western Pennsylvania and West Virginia now with exchange product. There are no specific plans to supply these customers with West Texas gasoline, although it's a physical possibility with pipeline facilities now available.

As a matter of policy, the company prefers to supply customers with its own gasoline, or to be capable of backing up an exchange arrangement in this way.

Cosden isn't interested in trying to compete in the heating-oil market. Its principal refinery at Big Spring is geared for maximum output of high-octane gasoline.

INDUSTRY BRIEFS . . .

Louisiana's oil allowance nominations are down 48,000 bbl. per day for March. The drop is due to a 50,000-bbl. cut asked by Gulf Oil, whose Port Arthur, Tex., refinery is closed by a strike. Other companies increased their nominations by 2,000 bbl. February production is about 857,000 bbl. daily.

Evans Production Corp., Dallas, has acquired a 40% working interest in six oil wells in Grice field of Loving County, West Texas, from Allridge & Stroud, Odessa, and James Leonard, Pecos. The wells, located on two leases totaling 400 acres, produce 540 bbl. daily from the Delaware sand. The field is about 16 miles north of Mentone. James Mays, Evans executive vice president, said his firm gets oil reserves estimated at about 200,000 bbl. via the deal.

Heavy, oil-industry equipment manufactured in Canada has found a market outside North America for the first time. Servicios Technicos Orientales, C.A., a drilling firm with headquarters in Anaco, Venezuela, has placed a $250,000 order for six "tracked" vehicles from Robinson Machine & Supply in Calgary. The transports are designed to haul equipment over muskeg, heavy snow, gumbo, and tropical swamps.

Berry Asphalt Co. of Magnolia has purchased properties of Benedum-Trees in the Troy field of Nevada County, Ark., for an undisclosed price. The purchase includes 27 oil wells on 1,200 acres of leases, gathering and transmission pipelines, storage tanks, and buildings. Production averages about 400 bbl. daily.

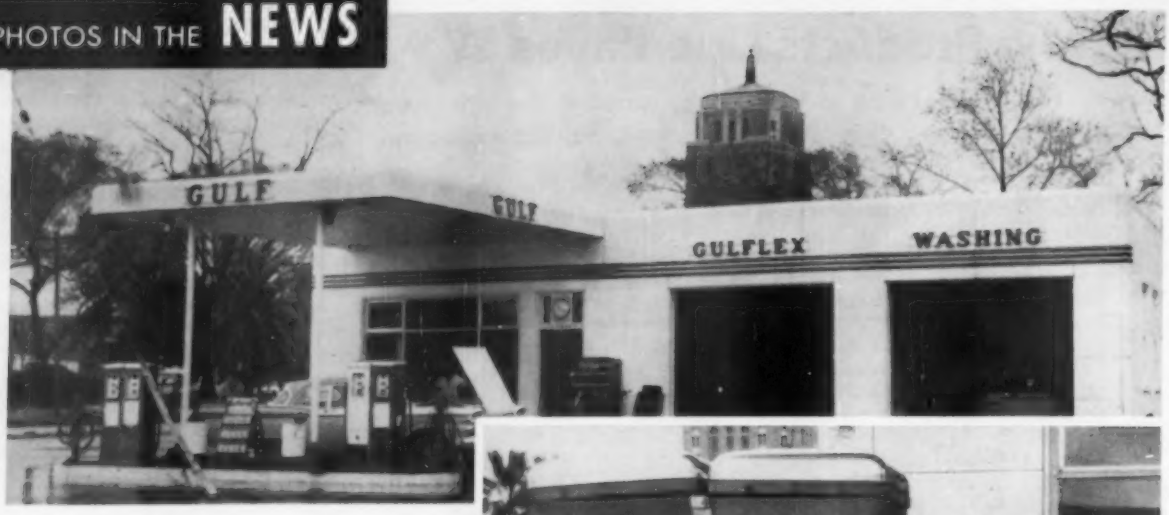
Heritage Petroleum Corp., Dallas, has acquired the outstanding capital stock of Frontier Drilling & Production Co., Midland, Tex. Frontier, organized in 1955, has been developing leasehold interests in Winkler County, Texas. Oil reserves of Frontier's net interest in the leaseholds are estimated at more than 1,800,000 net barrels.

A new producing county in Oklahoma may result from Magnolia's deep Custer County test in the western part of the state. The 1 Miller in Section 22-15n-16w tested 12 bbl. of black oil in 19 hours through 15/64-in. choke with 7,200 M.c.f. of gas daily from Hunton lime at 14,808-18. Earlier the wildcat showed gas in the Springer below 11,500 ft. Total depth is 17,000 ft. Successful completion would give Oklahoma 70 producing counties out of a total of 77.

The Crockett County well which made headlines 2 weeks ago by gushing a 7-in. stream of oil over the West Texas countryside was potentialed last week for 2,152 bbl. of oil daily. The well is the 3-BB Shannon drilled by Fred Turner, Jr., Midland independent. It has been completed as a Queen sand discovery. Location is about 5 miles southeast of Iraan, Tex.

The potential was calculated on a 4-hour flow test from open hole at 1,849-51 ft. The discovery has 7-in. casing set at 1,835 ft.

PHOTOS IN THE NEWS

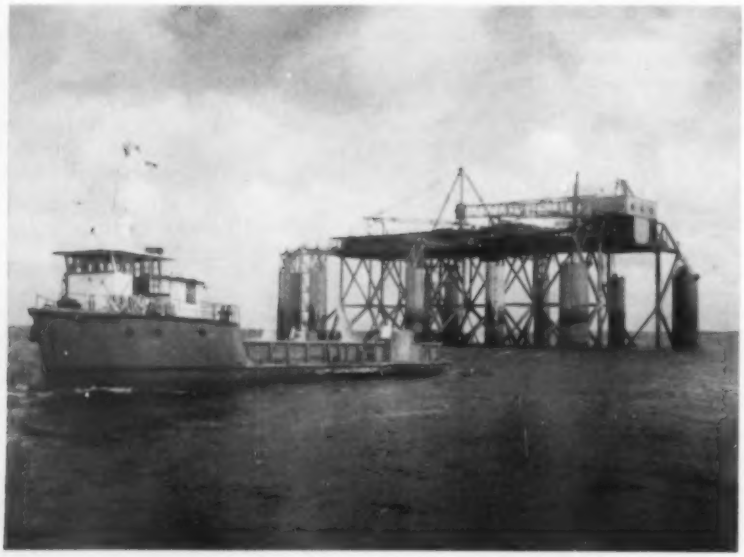


Gulf Pumps Blacked Out

Some Gulf service station operators in Beaumont and Port Arthur are covering their pumps (right photo) to prevent picketing by strikers at Gulf's Port Arthur refinery.

They have warded off picketing by covering the signs on the station pumps and selling another brand of gasoline. However, the Gulf station sign is still in plain sight (top photo).

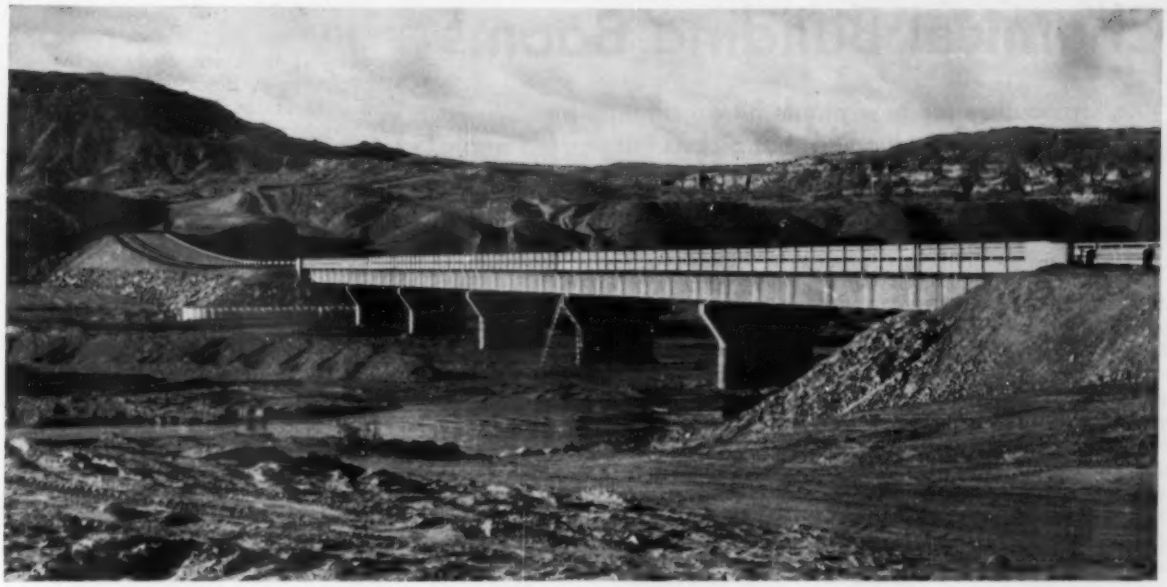
Some stations in the area have been picketed. At least three operators have filed charges with the National Labor Relations Board that the Oil, Chemical and Atomic Workers Union is violating the secondary-boycott provisions of the Taft-Hartley law.



"El Dorado" on the Move

Ocean Drilling & Exploration Co.'s barge, "El Dorado," is shown on the move in the Bay of Campeche to drill a wildcat 10 miles east of the Tortugero field at the southern tip of the Gulf of Mexico.

The barge is being towed by the "Whisky Pass," 120-ft. tug boat. Under contracts with Petroleos Mexicanos, Pauley Pan American Petroleum, Inc., associated with ODECO, will push a drilling program in an area 3 to 10 miles wide and 180 miles long in the Gulf of Campeche between Barra de Santacamopan and Barra de Paso Real.



THE SAN JUAN RIVER bridge in the Aneth area of Utah, recently opened to traffic, is expediting oil operations in the Four Corners area. The bridge is 50 miles southwest of Cortez, Colo. It cost more than $300,000 and was built through the cooperation of the Utah, Colorado, Arizona, and New Mexico highway departments, the Navajo tribe, the Bureau of Indian Affairs, and oil companies operating in the area.

Barge Commissioned

A new, $5-million offshore drilling barge, "Mr. Louie," was commissioned last week in New Orleans.

The mobile drilling unit, built by Universal Drilling Co., is named for Universal's president, Louis J. Roussel.

The 4,000-ton, 133-ft.-wide barge is capable of drilling to 20,000 ft. It has a number of new design and construction features. These include a positive-acting, double-locking hydraulic jack, four "outrigger" legs, and a locking mechanism for skidding the derrick into drilling position.

The barge can operate in waters up to 120 ft., with a clearance above waves of 40 ft.

Chemical Building Booms

. . . as outlay for new plants hit an all-time high in '58. Recession slowed planning, but pickup has started again.

CONSTRUCTION of chemical plants reached an all-time high in 1958.

Privately financed projects costing $1,775,000,000 were completed during the year, according to the Manufacturing Chemists Association.

The previous all-time high of $1.3 billion for completed construction was in 1957.

The MCA, in releasing results of its annual construction survey, said an additional $1.054 billion will be spent for projects now under way and $464,090,000 for projects to be started in the near future and finished before 1961.

This brings total chemical plant construction to an estimated $3.293 billion for the 3-year survey period 1958-60. This includes 802 projects by 287 companies in 43 states.

The $1.518 million total for plants under construction and planned (1959-60) is more than $1 billion under the $2.54 billion listed for the same categories in last year's survey.

This decrease has been partly attributed to construction cutbacks made during the recession months of mid-1958. By the end of the year, however, the industry's construction program had begun to speed up.

The MCA survey is based on activity within the chemical industry itself and on the chemical operations of firms, such as the oil and rubber companies, primarily identified with other industries.

The costs of foreign construction, government-financed construction, office, warehouse, and other separate service facilities are excluded, as is the installation or modification of equipment in existing facilities.

The leveling off . . . In addition to the cutbacks caused by the recession, the billion-dollar drop from the previous survey total for planned construction and under construction is said to reflect a general leveling off of the industry's requirements for new facilities.

This leveling off is not considered alarming throughout the industry because long-term goals — established after World War II to meet demands of a population increase and a rising economy—are being realized to a large extent.

The chemical industry, for example, has invested more than $1 billion in new plant and equipment for 8 consecutive years, and the average annual investment for the past 13 years has been more than $1 billion.

Most industry leaders, according to MCA, expect that new product demand resulting from recent technological and sociological trends will result in continued steady expansion of chemical-producing facilities.

Where it's happening . . . Texas with $662,323,000 again has the highest total figure for the three survey divisions of planned construction, under construction, and completed (1958) construction.

Louisiana is again in second place with $473,200,000, and California is third with $144,710,000.

Others in the top 10 are Tennessee, $142,576,000; West Virginia, $136,650,000; Ohio, $134,900,000; Pennsylvania, $127,190,000; New Jersey, $117,114,000; Illinois, $114,850,000; and Florida, $113,625,000.

Ranking 11 through 30 are Virginia, North Carolina, Kentucky, Michigan, New York, Indiana, Kansas, Oklahoma, Georgia, Maryland, New Mexico, Alabama, Mississippi, Massachusetts, Delaware, Washington, Connecticut, Missouri, Idaho, and Wyoming.

The top 10 chemical-producing states are New Jersey, Texas, New York, Illinois, Pennsylvania, Ohio, Michigan, California, Tennessee, and Virginia.

Location of chemical-producing facilities follows the pattern of most other industries—proximity to prime markets and transportation and availability of raw materials and adequate work force.

The West South Central states—Arkansas, Louisiana, Oklahoma, and Texas—again lead in total construction by region for the 3-year survey period, with a collective figure of $1.189 billion.

Other regions also repeat their order of last year. Second are the South Atlantic states — Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia—with $526,350,000. The East North Central states—Illinois, Indiana, Michigan, Ohio, and Wisconsin—are third with a total of $384,825,000.

Following these are, by rank, the Middle Atlantic, East South Central, Pacific, Mountain, West North Central, and New England states.

Construction not listed for specific areas accounts for an estimated total of $188,750,000.

Products . . . In the classification by products, the estimated 1958-60 total investment in new production facilities for general organic chemicals tops the list at $801,433,000.

General inorganics are in second place with $797,210,000, followed by plastics and resins, $392,745,000; synthetic fibers, $254,200,000; petrochemicals, $239,750,000; metals, $174,757,000; chemical fertilizers, $115,775,000; synthetic rubber, $53,523,000; and laboratories, $157,170,000.

A miscellaneous group accounts for $307,215,000.

The fiber category includes only those produced by chemical synthesis. Chemical products produced from petroleum and natural gas form the petrochemicals group, and the miscellaneous listing includes confidential data and construction difficult to classify more specifically.

Gas Price Reduced

by FPC examiner to avert possible general rate hike.

AN FPC EXAMINER has rejected a field price of 16 cents per M.c.f. for gas on grounds that it might set off a general price increase.

The decision, subject to review by the Federal Power Commission, authorized four producers to sell gas to El Paso Natural Gas Co. on condition that the initial rate be reduced from 16 cents to 13.348 cents per M.c.f.

Conditional certificates would cover about 50,000,000 cu. ft. of gas per day produced from Bell Lake field in Lea County, New Mexico. The producers are Continental Oil Co., Shell Oil Co., Phillips Petroleum Co., and Humble Oil & Refining Co.

The 16-cent rate is about 2.65 cents higher than El Paso pays to other producers in the Permian basin.

William J. Costello, the examiner, found there was room "for serious belief" that other producers would assert contract rights which might eventually increase El Paso's gas costs by $17 million to $35 million annually.

Mexico Tackles Big Oil Expansion Job

• Director of Pemex calls for marked increase in exploration and drilling activity, 477 wells planned this year using 118 rigs. Waste and corruption charged. Personnel reductions, hints of price increases draw fire.

MEXICO is planning to step up its drilling and exploration program this year.

The increased activity has been ordered by the new administration of Petroleos Mexicanos to provide the government-owned company with greater crude production required by Mexico's rising energy demand.

The exploration projects, actually, are part of a broad-scale Pemex program also including pipeline and refinery expansion. The big drive is aimed at meeting the rising demand with domestic products instead of stepping up the imports of expensive specialty crudes and products from abroad.

Emphasis on finding new oil in Mexico was revealed by Pascual Gutierrez Roldan, prominent Mexican industrialist who became director of Pemex in December.

Gutierrez recently told a group of visiting equipment manufacturers and supply-company executives from the United States that his administration will give the exploration and drilling departments of Pemex priority within the financial limits of the company.

He explained that he feels increased production and reserves are among his important first tasks and asked U.S. suppliers and investors to be fair in their business dealings with Pemex. Presumably Gutierrez had in mind pricing and liberality of credits.

Later, Gutierrez spelled out his 1959 drilling plans for The Oil and Gas Journal. He said Pemex expects to drill 477 wells this year—121 exploratory wells and 356 development wells.

This will be a sharp increase over drilling activity of the past few years. Pemex statistics are not yet available for the full year's drilling in 1958, but at midyear 152 wells had been drilled. In 1957, the company drilled 389 wells and in 1956 drilled 402 wells.

Gutierrez said the 121 wildcat wells this year will be divided among the oil districts as follows: 25 wells in the Northeast, 32 in Tampico, 18 in Poza Rica, 8 in Veracruz, 35 in the Southern Zone, and 3 in Lower California.

Pascual Gutierrez Roldan
. . . sparks expansion boom.

The 356 development wells include 18 in Noreste, 56 in Tampico, 87 in Poza Rica, and 195 in the Southern Zone.

A total of 118 rigs will be used in the program, 72 allocated for the development work and 46 for wildcatting. The drilling will be supported by about 50 seismic and geological crews.

The drilling-exploration plans actually are part of a broad project which Gutierrez has mapped out to make Pemex more efficient, make the country self sufficient in oil, and give the company a leading role in industrialization plans of President Adolfo Lopez Mateos.

These aspects of the Pemex program under Gutierrez already are emerging:

. . . **New financing** is being sought in New York. Negotiations involve a $40-million loan to Pemex from a group of New York banks. Despite published reports in Mexico City that the financial deal has been approved, official confirmation still has not been announced by the American investors.

Mexico City reports also say an additional $20-million credit has been arranged with five European banks to finance Mexican fertilizer and anhydrous ammonia plants at Minatitlan, Salamanca, and La Laguna.

. . . **Management reforms** are being undertaken. These involve higher prices in Mexico for refined products and attempts to reduce company personnel where possible. This part of Gutierrez' program is arousing the greatest domestic clamor.

The move to increase product prices is a break with past Pemex policy. Prices have been kept low purposely to help other Mexican industries and the general public. Instead the result has been a restriction on Pemex's cash accumulation for expansion. Moreover, it has resulted in abuses in product use. One source said, in this connection, that often the price of diesel fuel and heating oils were so close that the superior diesel was burned in space heaters.

Some other Mexican industries have voiced opposition to the price-increase policy. Gutierrez, however, insists his policy will be to get higher prices for refined products and to eliminate the unnecessary subsidies to other industries.

The move to tighten Pemex payrolls was preceded by a series of articles in the Mexico City press detailing instances of waste, inefficiency, and labor corruption in the oil industry. They were written by Antonio Vargas MacDonald, described as the new press secretary for Pemex. They undoubtedly were published with the tacit approval of the Lopez Mateos administration.

Vargas did not single out individuals in his articles but implied negligence and poor management in allowing the inefficiency and corruption. He said the cost of these practices to Pemex in the last 6 years exceeded $113 million.

He accused labor leaders of selling jobs and management of allowing

payrolls to be padded with "hundreds" of unnecessary workers. Vargas also charged that millions of dollars worth of equipment had been bought and eventually sold for scrap without being used. He said Pemex tankers had received unnecessary repairs in U.S. yards with Pemex employes receiving kickbacks from repair companies.

A spokesman for Mexico's oil workers union, Pedro Vivanco Garcia, tossed off the published charges as an attempt to prepare the Mexican public for return of foreign ownership in the country's oil industry.

This possibility appears slight because the Mexican constitution has been amended to eliminate even participation deals granted a few foreign operators in the past.

The Vargas revelations caught the eyes of Pemex friends in this country. They termed the discussions of business shortcomings in the government-controlled company a healthy sign. But the articles also raised one big question: If such conditions existed under the administration of a man of Bermudez' stature, can they ever be corrected as long as politics dominates the company?

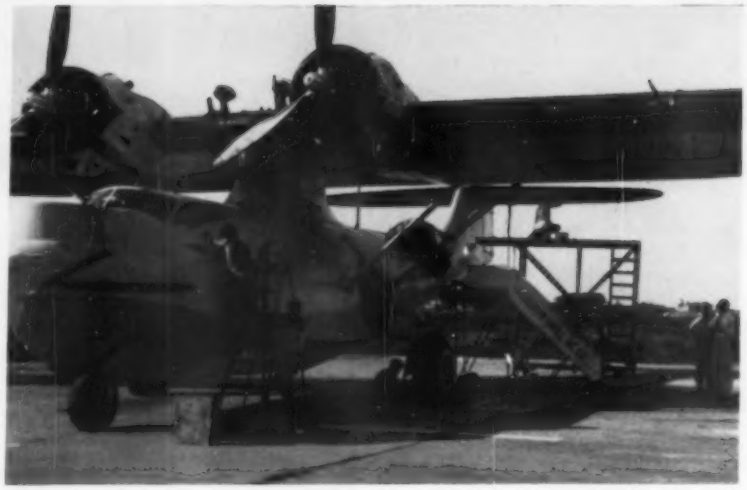
. . . **Pipeline expansion** plans include both new gas and products lines.

The major pipeline project is the 490-mile, 24-in. gas line from Pemex City on the Isthmus of Tehuantepec to Mexico City. Preliminary work has already started. Other gas lines planned for this year include Pemex City-to-Irapuato and Monterrey-to-Torreon projects. Three product lines also are planned from Mexico City to Toluca, from Mexico City to Cuernavaca, and from Monterrey to Torreon.

. . . **Refinery expansion** calls for completion of work under way at Minetitlan and Salamanca refineries. Projects for expansion of the Madero and Poza Rica installations will be expedited. The expansion at Atzcapotzalco has been completed, and new units already have been put on stream.

Pemex' activity already shows signs of hitting a faster pace. In addition to the increased drilling planned, crude production currently is averaging 269,400 bbl. daily compared to 267,333 bbl. daily last July. Gas production is 835,000 M.c.f. daily compared to 700,000 M.c.f. in July. Refinery runs are 287,500 bbl. daily compared to 246,072 bbl. daily at midyear.

Whether the ambitious plans to maintain and increase this activity will be realized depend on Pemex' ability to attract credit from abroad and to strengthen its profit position by domestic reforms.



Flying Boat Does Seismic Job

THE CHIEF business of most amphibious airplanes is to fly, even though they can set down on either water or land. But the main job of a flying boat being used by Pakistan Shell Oil Co. is to serve as a boat—a vessel that can take to the air when its job is done.

Pakistan She'l is using an especially equipped amphibian to make a seismic survey in the Ganges Delta area of the Bay of Bengal. Seven-eighths of the company's 10,000-sq. mile concession in East Pakistan extends into the bay. The water is too shallow for bigger ships to navigate. Sudden heavy gales and currents make the waters dangerous for shallow-draft vessels.

Pan Am Gets Argentine Well

. . . on first try in 53-well program. Second well looks good. Eighty firms interested in Atlas Group acreage.

ARGENTINA'S NEW oil program took on a rosy glow last week when the first well drilled by Pan American International came in as a producer.

The well flowed 470 bbl. on the first day of production. It is located in the Cerro Dragon region, north of the Port of Comodoro Rivadavia, and is the first successful well ever drilled by a foreign firm in Patagonia, in southern Argentina.

Pan Am's second well also showed signs of being a producer as it entered the pay zone.

Pan Am plans to drill 53 wells this year as part of a 15-year, $60-million program.

President Arturo Frondizi last year risked the life of his administration to push through the deals needed to solve the country's serious oil shortage.

Carl M. Loeb, Rhoades & Co. has not yet started drilling on its assigned areas. But work has started on a railroad feeder line, a pumping station, and field facilities. The Loeb, Rhoades Group plans to drill 53 wells this year. Partners in the project are South American Development Co., a subsidiary of Signal Oil & Gas, and Unola de Argentina, owned by Union Oil & Gas of Louisiana.

Open drilling bids . . . The bottom fell out of the biggest deal of all, an $800-million contract with the Atlas Group. But plenty of companies have come along willing to pick up the pieces.

At least 16 American and British, and 64 local firms, have shown an interest in drilling 4,557 wells in Patagonia in the next 6 years. The wells will be in an area intended for development by Atlas Corp. and Williams Brothers.

Companies submitting bids to YPF in New York for the drilling contracts were Parker International, Arrow Drilling, Loffland Bros., Delta Drilling, Kerr-McGee Oil Industries, Crispin Co., C. G. Glasscock, and Universal Export Corp.

Included among the firms which submitted bids directly to Buenos Aires were Pan American Land, K. L. Kellogg & Son of Confisa, Tex., Oil Royalty, and Simpson Drilling.

Reds Can Double Output

. . . of crude oil by maintaining recent rates of increase over next 7 years. Russian drilling still lags behind U. S.

RUSSIA has a good chance of doubling crude-oil output by 1965—considering her past production performance.

The Soviet Government is shooting for production of 4,800,000 bbl. of crude oil a day and 14,500,000,000 cu. ft. of natural gas daily by 1965.

Ivan S. Salnikov, New York, chief petroleum engineer for Standard Oil Co. (N.J.), doesn't think that's an unreasonable goal.

Salnikov provided a behind-the-iron-curtain look at Russian petroleum technology last week in San Francisco in a paper presented before the Society of Petroleum Engineers during the national convention of the American Institute of Mining, Metallurgical, and Petroleum Engineers.

The Russian target in crude-oil production is an average increase of slightly more than 14% per year over the next 7 years.

"In light of their recent annual increases in production, of 18% and 17.8% for 1955 and 1956, respectively, the rates do not appear to be unreasonable targets," Salnikov said.

Whether the goal is accomplished depends on progress of Russian drilling technology and application of new developments and production techniques.

Salnikov pointed out that while the Russians have made advancements, they are faced with problems.

Progress . . . Salnikov emphasized the importance of the transfer of the center of oil activity from Baku and the Caspian Sea to an area 800 miles east of Moscow.

He said this "has opened a tremendously large prospective area for exploration of oil and gas resources, and it has, figuratively, brought oil fields into the heart of the country." This change practically eliminated water transport of oil and made possible the construction of pipeline systems from oil fields to the populated industrial centers.

Problem . . . Drilling prowess of Russian turbodrills has been highly touted in the world press, yet Soviet drilling progress over the last 10 years has lagged behind the U. S.

Salnikov said the "big problem in Russia appears to be the lack of overall backup facility to support a full-going drilling effort."

Compared to U. S. rotary performance, which can maintain more than 50% of the time drilling on bottom, Salnikov said time analysis of Russian drilling shows an average of only 11%. He said there is a high percentage of fishing, over 10%, because of poor materials and mud control, and a very high service and idle time of over 40%. This is due to poor transportation, distant supply bases, and organizational delays compounded by poor management.

Salnikov added: "Briefly, Russia appears to have good technical backup but lacks the integrated cooperation and industrial facility which backs up the U. S. industry."

Future . . . Salnikov said odds favor a better climate for Russian petroleum economy. He gave these reasons:

. . . A concerted drive to reduce drilling production costs.

. . . Improved efficiency through automation.

. . . Improved planning through decentralization.

. . . Improved exchange of technical information among the various oil regions and between Russia and the free world.

Gas for Venezuelan

urban centers is goal in 5-year development program.

VENEZUELA'S old hopes of utilizing its natural gas have taken new shape in the form of a 5-year development plan.

The government-owned corporation, Corporacion Venezolana de Formento, has set as a target domestic and commercial gas sales of 161.9 million cubic feet daily by the end of the period. The agency expects to make gas available to 3,250,000 people in the main population centers, with domestic consumption reaching 45.3 million cubic feet daily.

Electric Utilities, owned by CVF will be the biggest users of gas, taking 109.4 million cubic feet daily. Industrial users in Caracas will take 7.2 million cubic feet daily.

Construction of a nation-wide natural-gas pipeline network was started 3 years ago by the Jimenez government. But the deposed regime concentrated its efforts on Petroquimica, an agency building a gas-based Petrochemical Complex at Moron. This development later turned into a national scandal.

Petroquimica had been such a popular project the provisional government made a nation-wide radio appeal asking public support for its reform. Dr. Carlos Perez de La Cova, then the Minister of Mines and Hydrocarbons, wanted to keep the agency in the hands of the government, but charged most of a $150-million investment in the program had been wasted (OGJ, Sept. 22, 1958, p. 71).

German Oil Use Up

again in 1958 as postwar boom keeps demand high.

A 54.5% INCREASE in fuel-oil sales in West Germany last year has ended remaining fears that the country's postwar boom might have been slowed down permanently by the Suez crisis 2 years ago.

Fuel-oil sales of 140,000 bbl. daily, not including bunker deliveries or refinery consumption, far outstripped forecasts. The gain compared with a 29.5% increase in 1957. Light fuel oil sales were up the most with a gain of 81.5%.

Motor-fuel consumption rose 15.5% to 93,000 bbl. daily. The preceding rise was 11.8%. Diesel-oil sales surprised the industry with a gain of 14.2% to 81,000 bbl. daily, compared with a 1.3% increase in 1957.

Sales of the three major products alone were larger than total refinery output. Refinery production was up 28.1% to 296,000 bbl. daily. This compared with a 4.1% rise in 1957.

Motor-fuel production, mostly gasoline, averaged 100,000 bbl. daily. Diesel-oil production was up to 79,000 bbl. daily and fuel-oil production to 81,000 bbl. daily.

Israel Line May Be Enlarged

FRENCH and American investors, headed by Baron Edmond de Rothschild, reportedly have agreed to finance a $25-million pipeline project in Israel.

The program would increase crude throughput of a 250-mile system from the Gulf of Aqaba to Haifa refinery from 30,000 bbl. to 100,000 bbl. daily. This is to be done by replacing a 125-mile, 8-in. section with 16-in. pipe, the diameter of the rest of the system. Israel built the 8-in. section from Elath to Beersheba in a crash program 2 years ago.

Big Oil Push Is Abroad

. . . as increasing number of American companies join hunt for foreign crude. This trend is expected to continue.

STIFFER COMPETITION, higher-priced concessions, and bigger oil-profit bites for foreign governments are in store for American companies operating abroad.

That's the future picture supplied by H. W. McCobb, White Plains, N. Y., vice president of Standard-Vacuum Oil Co. McCobb projected current trends in foreign operations in a paper last week before the Society of Petroleum Engineers at the national convention in San Francisco of the American Institute of Mining, Metallurgical, and Petroleum Engineers.

McCobb emphasized trends likely to take on greater significance in the years ahead. He listed them as:

. . . **The entry** of more and more U. S. oil firms into foreign operations.

. . . **The penetration** of the free-world oil markets by Russia.

. . . **More foreign** government participation in oil ventures.

Foreign activity . . . The number of domestic companies operating abroad more than doubled during the 5-year period from 1952 through 1957.

In 1952 there were 72 U. S. firms engaged in 164 exploratory and producing operations in 51 foreign countries. By the end of 1957, the total had jumped to 150 companies with an estimated $8 billion invested overseas. The companies were involved in 398 operations and had spread their activities to 73 countries.

McCobb said this stepped-up tempo results, largely, from the desire by domestic firms to take part in the dynamic growth of foreign markets, the feeling that the growth of demand in the United States has become relatively slow, and increasing cost of finding oil at home.

He pointed out that world production is expected to reach 29.5 million barrels per day in 1967. He estimated that capital expenditures of $140 billion will be required to support that expansion—and most of the money will be spent abroad with foreign investments expected to increase 140% over the level of the last 10 years.

Soviet prospect . . . Russian exports are due to increase for two reasons.

McCobb points out that Soviet crude can be bought on a barter basis, which permits importing countries to hang onto currency reserves and frequently to dispose of goods which could not be sold on the world market. Also, Russia is willing to make price concessions because of her ability to disregard economics in favor of political expediency.

Outlook . . . McCobb said increased foreign activity by U. S. firms and stepped-up Soviet exports point to intensified oil-industry competition.

And stiffer competition means foreign concessions may command higher prices and prompt governments to demand greater participation in oil operations.

Phillips Lake Stepout Hits

A STEPOUT to the Phillips Petroleum discovery on the western end of Block 10 in Lake Maracaibo flowed at the rate of 5,992 bbl. daily on initial tests.

The well is 1,900 ft. southwest of the Santa Maria field discovery well. Completed last year with a flow of 4,080 bbl. daily.

Another development well is drilling ahead on the same block 9 miles east. It is a stepout to the Phillips group's second discovery on the block, the LSG 16-2, completed last year in Eocene with a flow of 3,336-bbl. daily of 18.5-gravity crude through a small choke.

Phillips owns 45% of the concession, awarded by the Venezuelan Government 2 years ago. Its partners are San Jacinto, El Paso Natural Gas, Western Natural Gas, Sunray Mid-Continent, and Pacific Petroleums.

WORLD BRIEFS . . .

"Moplen" polypropylene will be produced in France under license agreements signed between Montecatini and two French industrial groups, Pechiney and Ste. Normande de Matieres Plastiques. Two plants, each with an annual capacity of 22,000,000 lb., will be built in France.

One of West Germany's first discoveries this year has been made 2 miles west of Lueben field, near Wittingen. The Gewerkschaft Elwerath-Itag-Mobil Oil-Preussag group tested Lueben-West 1 with an initial flow of 150 bbl. daily through a 1/10-in. choke. The 36.5° crude came from an 8-ft. section at 4,748 ft.

Design capacity of the new Socony Mobil refinery at El Palito terminal of Barinas pipeline in Western Venezuela has been raised from 40,000 bbl. to 50,000 bbl. daily. The plant is expected to be completed in March 1960.

Negotiations on a proposed Pakistan refinery are getting under way between four companies and the government. Burmah Oil, Standard-Vacuum, Caltex, and Royal Dutch-Shell have already recommended a 30,000-bbl., $32 million plant for Karachi.

CREPS has brought in another discovery in the Edjele area of Algeria, near the Libyan border. Hassi Mazoula encountered both gas and oil at 6,500 ft. The company expects to sign contracts soon for a 470-mile, 24-in. pipeline from the area to El Shkirra, Tunisia.

The contractor building the 412-mile, 24-in. crude pipeline from Hassi Messaoud in Algeria to the Mediterranean expects to complete the line in June. Soc. Petroliere de Garance is hoping to start initial shipments of 80,000 bbl. daily in October, but is asking for more military protection from rebels.

Frobisher, Ltd., a Canadian company with extensive mining interests in Canada and elsewhere, has acquired exclusive rights to explore a 70,000-sq.-mile area in the southwestern portion of Somalia.

The Moroccan Government will play a larger role in the local oil and gas industry. It has increased its ownership in Soc. Cherifienne des Petroles from 45 to 50% and plans to spend $2 million this year to develop a new gas field near the Atlantic Coast. France and private French interests hold the remaining interest in SCP.

A French company may have a second discovery in a concession south of Paris. Cie. d'Exploration Petroliere encountered an oil show at 5,500 ft. in Perthes 1. The test is west of Chaillisen-Biere where two producers have been drilled. The first yielded 38 bbl. of crude on an 8-hour test (OGJ, Jan. 26, p. 116).

HUDSON SERVES THE URANIUM INDUSTRY

In Ontario, Canada, near the northern shore of Lake Huron, Hudson Engineering (Canada) Limited has recently completed the construction of a major uranium ore mining and milling project for Stanrock Uranium Mines, Limited. Located in the Blind River area, which contains the free world's largest reserve of uranium, the design quantity of 3,000 tons per day is being mined and milled, uranium oxide being the end product.

The experience of Hudson in design and construction for the oil, gas, chemical and mineral industries is available for any size project anywhere in the world.

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THE DAY AN INDUSTRY WAS BORN

THERE is no more historic day in the drilling industry than that day in 1909 at Goose Creek, Texas, when the first rotary rock bit was run under the watchful eyes of its inventor, Howard R. Hughes, Sr. For what happened that day revealed the real potential of the rotary system and marked the beginning of the rock bit industry.

Mr. Hughes—lawyer and mining engineer, turned drilling contractor—was no novice to rotary drilling. He had personally experienced the frustration of grinding away, days at a time, with fishtail bits without making measurable footage.

The bit he invented was the answer to drilling hard formations with the rotary. It introduced a new principle—conical cutters combining milled teeth that rolled on bottom with a chipping, crushing action and grooved gage surfaces that simultaneously cut the wall of the hole.

The footage drilled with Mr. Hughes' rolling cone bit exceeded, by far, anything that had ever been dreamed possible. Its success, and the success of the Hughes bits developed during the past fifty years, stemmed from a first-hand knowledge of the problems of the industry. Hughes engineers and field representatives today are men of long experience in the industry. Combined with their experience is another important ingredient—*research*—carried on continuously for a half century.

Through the years, Hughes has introduced virtually every major improvement that has been made in rock bits. But no single achievement has had greater impact on rotary drilling than that first rock bit run at Goose Creek in 1909.

In the painting at the left, the artist has re-created the scene of the running of the first rock bit. So important was secrecy that members of the drilling crew were ordered from the rig, and their places taken by Mr. Hughes and his three companions. Then, Mr. Hughes opened a padlocked wooden box, lifted out a burlap-wrapped bit, attached it to the end of the drillstem, and pulled the wrapping away as the bit was lowered into the hole. When it was safely out of sight, the crew was called back to resume drilling.

Enlarged color prints of this painting are available for the asking. Write: Advertising Dept., Hughes Tool Company, Box 2539, Houston, Texas.

HUGHES TOOL COMPANY

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Service is a man with a medical case rushing to his patient in the black, cold hours of early morning. Or a man in a yellow hard hat gulping a 3 a.m. cup of java on his way back from "doctoring" an oil well. Both kinds of service call for men who know what they're doing and take pride in doing it well . . . day or night, fair weather or foul. Your well service jobs—cementing, fracturing or acidizing—deserve the same all-out attitude and effort. For *extra* service that pays off at the wellhead, call the company whose name *is* service—*BJ Service, Inc.*

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Special Report

BY THE EDITORS OF

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8. Depletion and Conservation
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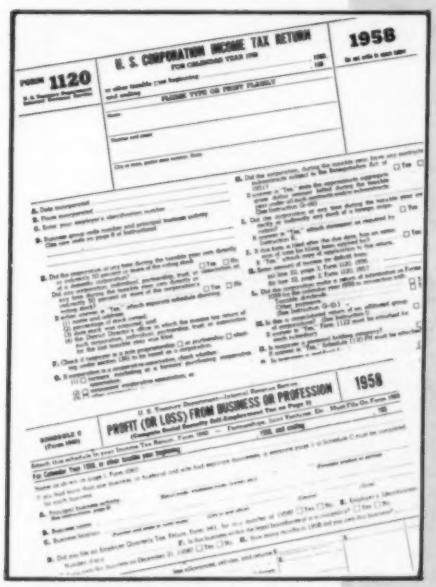
10. What About Substitute Fuels?
11. What of Oil's Future?



FORM 1120 U. S. CORPORATION INCOME TAX RETURN 1958

SCHEDULE C PROFIT (OR LOSS) FROM BUSINESS OR PROFESSION 1958

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The case for 27½% Depletion

CRITICS OF THE OIL INDUSTRY love to paint it as a fat man grown unduly rich through special tax privileges.

The greatest privilege, they say, is the depletion allowance. They argue: Eliminate or reduce it and you put petroleum on a fair footing with other industries.

This year Congress will consider two bills, introduced into both houses, each calling for a reduction in percentage depletion on oil and gas.

It is no moderate reduction they seek. It is a slash, from 27½% to 15%.

Again and again in the past 33 years Congress has carefully reviewed its own laws on percentage depletion. It has always found them equitable, workable, and, above all, practical from the standpoint of national welfare.

But the issue is raised again. The present 27½% provision is needed today as never before. In fact, any tampering with this long-established pattern would create a serious threat to our national security.

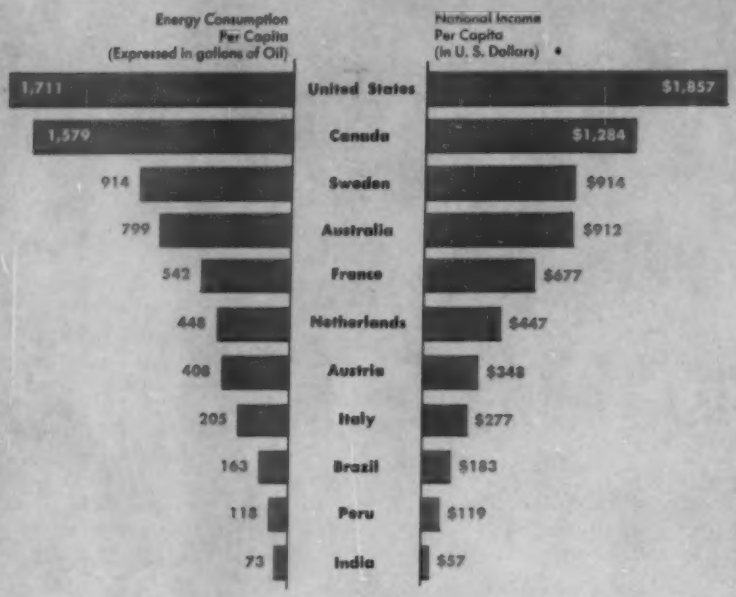
Why? Because we have become almost completely dependent upon petroleum. An energetic, healthy oil industry is recognized as a critical factor in this nation's military strength and in our present standard of living.

A cut in percentage depletion can only reduce our ability to find more oil and gas to replace that which we consume every day. And an inadequate search for new oil would lead to a domestic shortage, crippling our ability to fight a global war. It would drain the strength we must have to avoid a defensive war. It goes almost without saying that it would depress our standard of living, in peace or war.

These things the Journal believes. We also believe that most of the opposition to 27½% depletion stems from a lack of understanding of its objectives and its workings. It is for this reason that this special section was prepared.

ENERGY: Key to our standard of living—our national security

ENERGY CONSUMPTION AND NATIONAL INCOME*



*Source: Joint Congressional Committee on Atomic Energy, based on data for 1952.

This nation of ours consumes over a million gallons of petroleum every 4 minutes, day and night, winter and summer. In less than 3 seconds we burn a million cubic feet of natural gas.

These two sources of energy permeate our economy as no other single commodity. Oil and gas keep America going!

There are two basic reasons why our national momentum has become so closely bound to this one energy source. First, it has been made available to every corner of the land. Except in times of war, it has been available in great abundance.

Secondly, it has remained within the reach of everyone's budget. The American public takes it for granted that it can afford to drive to the store, the plant or office, and to take that vacation trip by car. But the price of gasoline is but a minor factor in America's growing dependence on oil.

The cost of oil and gas is counted again and again in everything we buy. It is part of the cost of developing our natural resources and growing our food. It plays a part in converting raw materials to finished products and in delivering them to our doors.

Thus the cost of oil and gas is compounded in everything we purchase. An increase which would raise the cost of a raw material 5% would raise the cost of a finished product 20 to 26%.

Why the issue is important

Oil is critically important to us today because our entire economy has become based on an extremely high use of energy.

One hundred years ago we depended almost completely on the muscles of men and animals. Today we see the picture reversed. We depend almost completely on the energy of machines, powered primarily by oil and gas.

This is an age of mobile engines fueled and lubricated by oil—in cars and trucks, in locomotives and aircraft, in sports boats and ships at sea. It is the age of convenience—of kitchen appliances and home workshops—and as we trace back to the original fuels that generate their energy, we find oil and gas dominating the scene.

Coal and water power also contribute to this energy system which gives every American the equivalent of 50 servants. But there is one basic difference between petroleum and these other sources.

Oil is the one form of energy that is irreplaceable by any other for many vital uses. There is no available substitute today for gasoline, or diesel fuel, or jet fuel. We cannot do without these commodities and maintain our way of life. From a military standpoint our dependence is even greater.

We do have today an excess of capacity for producing petroleum. But this excess exists only because we are importing oil. In the event of war, we would undoubtedly be cut off from all of these imports which originate outside our continent.

In past periods of international tension, our potential foes were "have-not" nations with respect to oil. But today our major differences are with a nation which not only has enough oil to energize a war machine but which is increasing its reserves each year.

Our military needs have grown by leaps and bounds. Jet planes consume roughly three times as much fuel as gasoline-powered craft. While we are entering an atomic age which will see some replacement of petroleum fuels, we are still far from independence. During World War II, 2 out of every 3 tons of supplies used in our military effort represented petroleum products. This ratio could well reach 3 out of 4 tons in any conflict in the next several years.

Why percentage depletion?

What bearing does such a thing as "percentage depletion" have on national security? What is it and how has it worked?

In tax language, depletion is a deduction from operating income, provided by law to return to the owner the capital consumed in operating a mine, a quarry, or an oil or gas well.

The Constitution empowers Congress to tax income from capital, but not capital itself. In all cases where a business involves the use of capital, that capital is either worn out or depleted in producing income. So, the total returns it produces include some income and some capital.

Our tax laws take this into consideration with several types of tax-exempt deductions which can be subtracted from total returns. Some of them are depreciation, capital gains, cost depletion, and percentage depletion.

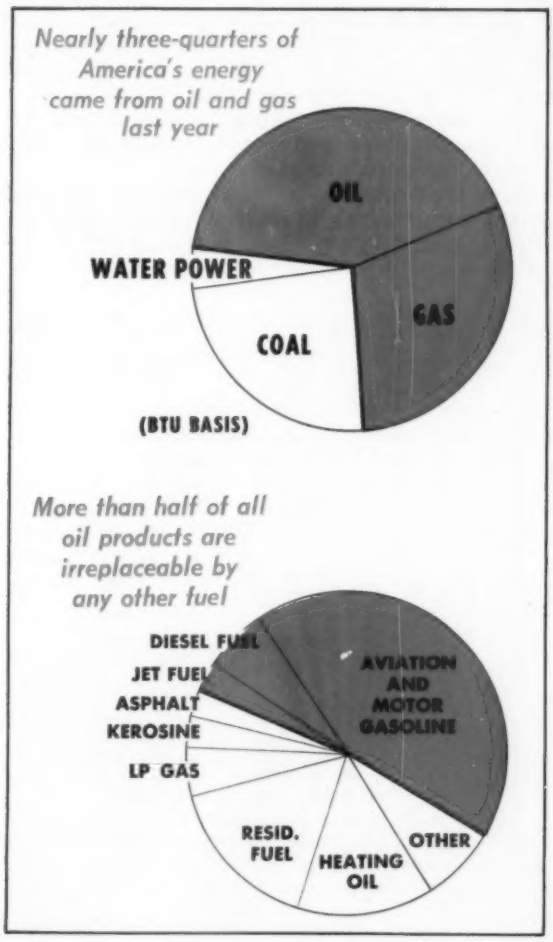
Depreciation allows the tax-free return of the cost of a piece of equipment, as that equipment is worn out in producing income. Each year its cost divided by its estimated life is "depreciated" as returned capital. By the time the equipment is worn out, the owner has been able to set aside its original cost tax-free so that the money can be reinvested in more equipment to produce more income.

In some cases, capital itself is sold outright either all at once or little by little. When the seller gets more than he paid for it in a single sale, the profit is subject to a special tax limited to 25%. This is known as capital gains.

Oil, gas, coal, and other minerals are considered to be capital in their original state in the ground. Sometimes these deposits are sold outright. In such cases the purchaser who may pay $1.25 per barrel for the oil in place is entitled to deduct that amount tax-free from each barrel's income as it is brought to the surface and sold. This form of deduction is termed cost depletion. During the life of the deposit, as his capital is sold little by little, the operator is returned the amount of his original capital investment, to permit him to reinvest the money in more oil reserves.

In all these cases a value has been set on the capital items involved. The value is based on what someone is willing to pay for it. That is, value is determined directly by cost.

But when a new reserve or deposit of oil or coal or metal is discovered in the first place, it has a value which is not necessarily related to the cost of finding it. When you are searching for oil, you are not assured of finding X dollars' worth of oil by spending X dollars looking for it. Sometimes you discover oil worth more than you spent, sometimes less. More often than not, you spend your money and find nothing.



How it started

Congress took note of the peculiar differences between oil and other industries in 1918.

At that time the Allies had just "floated to victory on a sea of oil." But the future supply of oil for our growing economy and our continued national security was a matter of deep concern.

It recognized the unusual nature of oil finding by providing that the discoverer of an oil deposit could compute his depletion deduction on the basis of the **value of the oil found** rather than the cost of finding it.

This introduced the concept of "discovery depletion" which has been sustained by Congress and the courts.

But there were difficulties in applying this principle. The value of a new oil or gas strike had to be determined within 30 days after its discovery. It isn't possible to get a close estimate of the amount of oil found in a new discovery without further drilling and development of the field. This sometimes takes years.

As a result, some differences of opinion arose on how much oil was found and what was its fair value.

Long delays resulted in figuring tax deductions. Litigation swelled in the courts.

Realizing that this law was unworkable, Congress created a Select Senate Committee to study the problem. Its members confirmed the soundness of basing depletion deductions on value and the drawbacks in applying it. At the same time, they recognized that the discovery value of oil was fairly closely determined by the price someone would be willing to pay for it. The committee then turned to the possibility of simplifying the whole procedure by tying the depletion rate to a fixed percentage of gross income realized from the oil as it was produced.

"In the interest of simplicity and certainty in administration, your committee recommends that in the case of oil and gas wells the allowance for depletion shall be 25% of the gross income from the property during the taxable year," reported the committee. It suggested that this deduction be limited to 50% of net income following a previously enacted law.

The 25% figure represented an average. On the whole, the value of oil in the ground varied between 25% and 30% of the selling price at the wellhead, so one-quarter or more of the gross returns represented capital sold.

Senator Reed of Pennsylvania observed at the time that 25% conformed to actual experience and would achieve the same results as discovery-value depletion, but without the guesswork.

"If there is any error in the 25% figure," he said, "it is in favor of the Government." During Senate debate, the higher levels of 35% and 40% were proposed. Finally, a 30% figure was agreed upon, and the bill was adopted by the upper house.

Meanwhile, the House ways and means committee had agreed to recommend 25% as a proper deduction. So, the compromise of 27½% was eventually reached by the two committees in conference. The Revenue Act of 1926 established this new "percentage depletion" in place of discovery-value depletion, and made it retroactive to January 1, 1925.

Thus percentage depletion was born.

The percentage is smaller . . . In some respects it is unfortunate for the oil industry that this change became necessary. For one thing, it has become an unwarranted target of criticism, just because it is different from other forms of deduction. Those who do not understand its origin feel that it is a "loophole" or a "device" giving an industry special privilege. It is neither of these.

In another way, it is unfortunate that percentage depletion became necessary. For if the discovery-value basis had proved practical in use and was in effect today, oil men would be deducting more than they are under the fixed 27½%.

Here's why. According to the U. S. Bureau of Mines, the average price of crude oil sold at the wellhead in 1958 was $3.01 per barrel. To this add 20 cents per barrel for the value of gas produced per barrel on the average.

If the full 27½% depletion were applicable, the operator would be able to deduct about 88 cents per barrel before taxes as his return of capital. Actually, the limitation of 50% of net income reduces average effective depletion to about 23%. So the discoverer of an oil field gets only 74 cents per barrel in capital return.

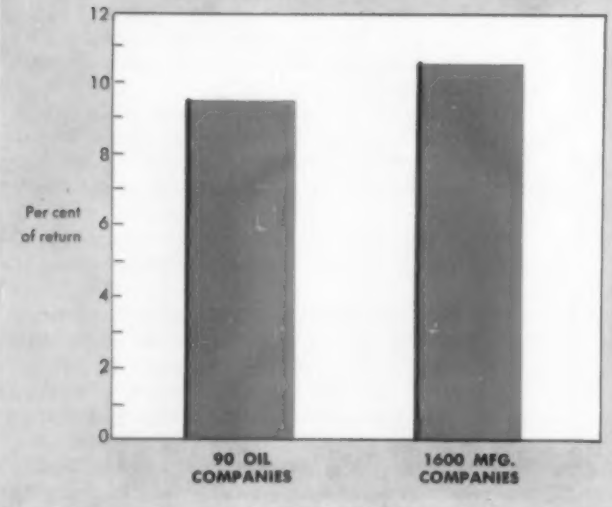
But oil **in the ground** is selling today for $.90 to $1.25 a barrel. In an outright purchase of such properties, the buyer is entitled to deduct up to $1.25 out of each $3.00, or 40% of gross income.

This means, then, that the wildcatter who finds the oil is allowed a lower return of capital than the buyer of oil reserves already discovered.

If the oil finders were to receive a full return of their capital today, the depletion level would have to be at least 33⅓% with no limitation of 50% of net income.

Here's the 30-year record--

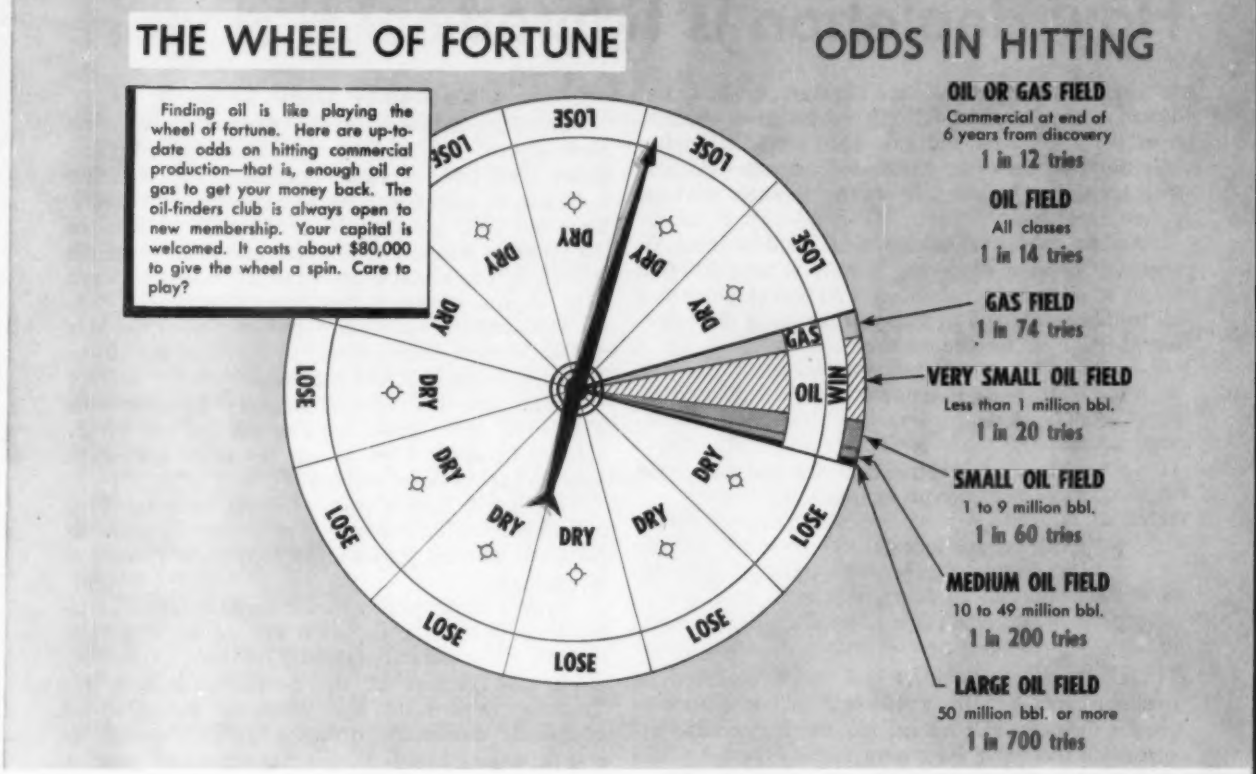
How much do oil companies earn?
(1925-1956)



Some members of Congress favor reducing depletion because "some oil companies make too much money." On the other hand some make too little—and go broke. It's the successes, not the failures that gain national attention.

What about the average? During the past 30 years, the oil industry has made a lower per cent of return on its assets than "All Manufacturing Companies." These figures were compiled by First National City Bank of New York.

For a more recent look, a 1957 survey shows oil making a 13.6% return on net assets compared with 12.8% for all manufacturing. Petroleum makes a lower net income than autos and trucks, soap and cosmetics, chemical products, soft drinks, paint and varnish, cement, glass and aircraft to name a few.


THE WHEEL OF FORTUNE
Finding oil is like playing the wheel of fortune. Here are up-to-date odds on hitting commercial production—that is, enough oil or gas to get your money back. The oil-finders club is always open to new membership. Your capital is welcomed. It costs about $80,000 to give the wheel a spin. Care to play?
LOSE
DRY
GAS
OIL
WIN
ODDS IN HITTING
OIL OR GAS FIELD
Commercial at end of 6 years from discovery
1 in 12 tries
OIL FIELD
All classes
1 in 14 tries
GAS FIELD
1 in 74 tries
VERY SMALL OIL FIELD
Less than 1 million bbl.
1 in 20 tries
SMALL OIL FIELD
1 to 9 million bbl.
1 in 60 tries
MEDIUM OIL FIELD
10 to 49 million bbl.
1 in 200 tries
LARGE OIL FIELD
50 million bbl. or more
1 in 700 tries

Why depletion percentages differ

As an oil well is produced, the owner receives two kinds of returns. One kind is the capital value of his discovery, the value represented by the oil in the ground as he discovered it. This is capital and not subject to tax. The remainder is income and is taxable.

The depletion provision allows him to recover, tax-free, the value of his oil so that he may reinvest that capital in the search for more oil. Otherwise, having produced his last barrel of oil, he would have depleted his capital.

This basic concept of depletion applies to all extractive industries. Depletion percentages vary. Here are some of them:

Sand and gravel	5%
Coal	10%
Metals and other minerals	15%
Sulfur and uranium	23%
Oil and gas	27½%

Why do these percentages differ? Because natural resources vary in abundance, in the degree of financial risk involved in hunting for them, in the amount of capital required to find them, and in the extent to which Congress considered it should encourage their development.

Each figure is somewhat arbitrary. It represents an educated guess by Congress as to how much of the delivered price represents capital value, as distinguished from operating profit or value added by extraction or processing.

Sand and gravel, for example, are relatively easy to find and inexpensive to develop. Most of the price of a load of gravel represents the work of digging it. Only 5% of it—in the judgment of Congress—represents the capital value of the gravel as it was found.

On the other hand, no other industry must invest so much capital per dollar of sales as does the oil and gas-producing industry. The actual cost of getting a barrel of oil from the bottom of the well to the surface, unlike sand and gravel, is usually only a small portion of its price. A very big portion, however, represents its capital value. Therefore, the percentage allowed for depletion of its capital is properly higher than the others.

How depletion is figured

Under present tax law, an oil operator is allowed to deduct a maximum of 27½% of his gross receipts from the sale of oil and gas. This provision applies only to oil or gas at the wellhead. Companies engaged in transporting, refining, or selling finished products get no depletion.

As an example, assume that an individual or company owns a producing lease and sells $10,000 worth of oil in a year. If it costs $3,600 to pump this oil to the surface and to maintain the lease, the owner would figure his income tax thus:

$10,000	gross income
—3,600	costs
$ 6,400	income before depletion and income tax
—2,750	depletion deduction
$ 3,650	taxable income
×.52	tax rate
$ 1,898	income tax

But there is a limit to how much depletion an operator can take. His depletion deduction cannot be greater than one-half his net income. If operating expenses on the above lease were $5,500, the tax would be figured in this way:

$10,000	gross income
—5,500	costs
$ 4,500	income before depletion and income tax
—2,250	depletion deduction (½ net income)
$ 2,250	taxable income
×.52	tax rate
$ 1,170	income tax

It's Really Only 23%

On many individual leases, production costs are even higher. But a company cannot spread these higher costs over its entire operation. The depletion deduction for each lease must be computed individually. Since the 50% provision limits depletion to 20% or less on many leases, and since the maximum permitted is 27½%, the **effective** depletion is reduced to about 23% of gross income for the industry at large.

This estimate is confirmed in the testimony last May of Dan Throop Smith, deputy to the Secretary of the Treasury, before a Senate committee.

Smith said that reducing statutory depletion from 27½% to 15% would increase the tax bill of the industry by about $390 million at current production rates and prices of oil and gas.

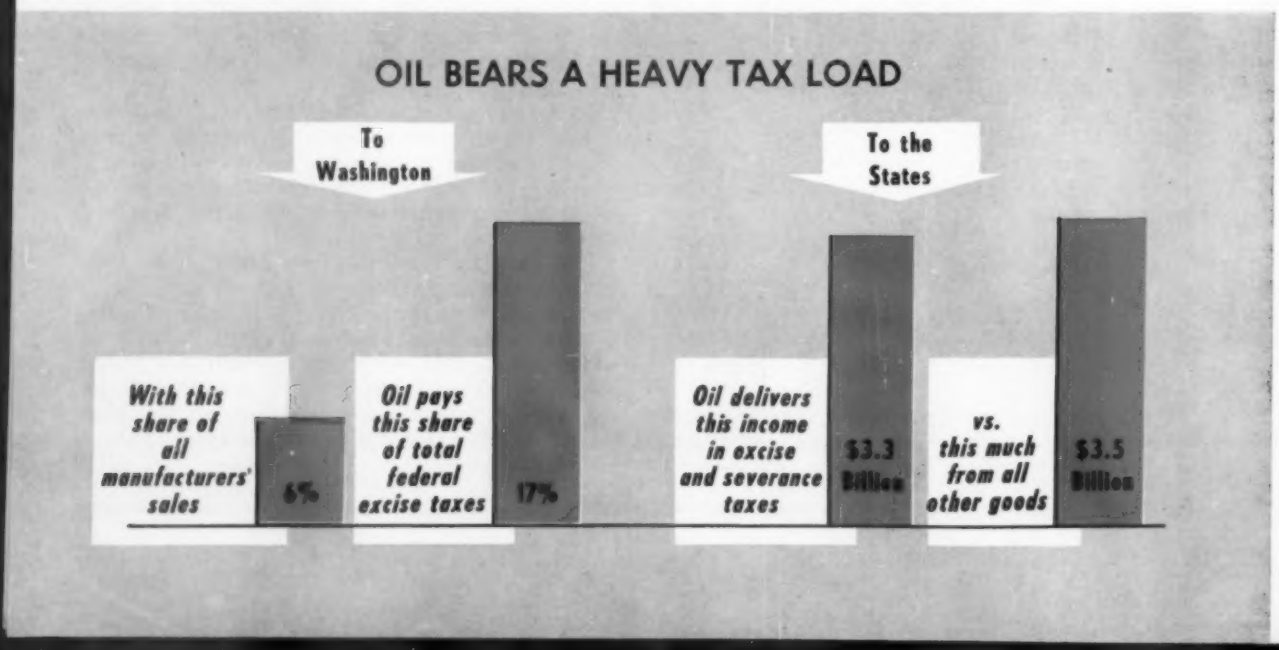
The latest figures then available were on 1957 operations. During that year, the Bureau of Mines reports the industry produced $9,233,808,000 worth of oil and gas.

Smith's $390 million figure, then, assumed an effective industry-wide depletion rate of about 22½% to 23% at the statutory rate of 27½%.

At the request of the Senate committee, the Treasury Department also estimated the effect of **completely eliminating** depletion. After allowing for cost depletion, it said, the Government would gross an additional $925 million for domestic operations. But the Treasury immediately dropped the figure to $775 million after figuring loss in income tax as a result of reduced oil-company dividends.

This official estimate was further qualified. It does not, said the Treasury, include the tax shrinkage resulting from lower incomes of companies and individuals serving the oil industry.

But even without this intangible reduction, $775 million falls far short of the magic "Three-Billion-Dollar Loophole" commonly attributed to depletion by some of its political opponents.


OIL BEARS A HEAVY TAX LOAD
To Washington
To the States
With this share of all manufacturers' sales
6%
Oil pays this share of total federal excise taxes
17%
Oil delivers this income in excise and severance taxes
$3.3 Billion
vs. this much from all other goods
$3.5 Billion

How is it working?

In setting up the depletion provision, Congress was prompted by two desires: (1) Provide an incentive for oil finders, and (2) give them a means of regaining their capital for further investment in the search for oil.

Many times since then the 27½% figure has been attacked as a "loophole," a "tax gimmick," or an unfair and inequitable device to favor the "millionaire" oil companies. It is none of these.

The history of oil since 1926 provides proof.

For 33 years the industry added more to reserves than it withdrew. For 33 years the prices of petroleum products lagged the national average. The low cost of gasoline, of ever-improving quality, put America on wheels.

Had percentage depletion been too low, the supply would have been less and prices would have been greater. Had it been too high, an inordinate flow of capital would have been directed into the finding of oil and gas.

Neither of these extremes has been evident. Petroleum products have continued to be available in adequate quantity at a reasonable price. On the other hand, the industry is not overcrowded.

Today there are hundreds of undrilled geological prospects awaiting only the capital required to explore them. We have a cushion of excess capacity to meet military needs and to provide for emergency demands for oil at home.

This delicate balance has continued through the years without the investment of a single government dollar. It provides the best possible proof that Congress in 1926 hit upon a percentage depletion figure neither too high nor to low.

Rising Costs Are a Threat

But times are changing. Every barrel of oil that is found is one less barrel to be found. As the industry moves to more remote prospects and drills to greater depths to find oil and gas, it faces extraordinary costs.

These rising costs are not being reflected in higher prices for crude oil. As a result, many producers are feeling the need for a higher percentage depletion if they are to continue the search for new oil.

In fact, there is a growing trend among small independent operators to sell their discovered production, take their capital-gains allowance, and leave the business. One spokesman recently said that we were not running out of oil, but we might be running out of oil men.

Suppose we cut it?

It would be ridiculous to attempt to specify the complex chain of reaction which would follow a slash in percentage depletion.

But a reasonable evaluation of the major consequences is possible. And it points inexorably to a deterioration of our effort to find oil for tomorrow's needs.

Those members of Congress who are advocating a reduction in percentage depletion assume that the federal treasury will reap a vast harvest of additional revenue. And, they believe that the reduction will not seriously hamper our search for oil and gas.

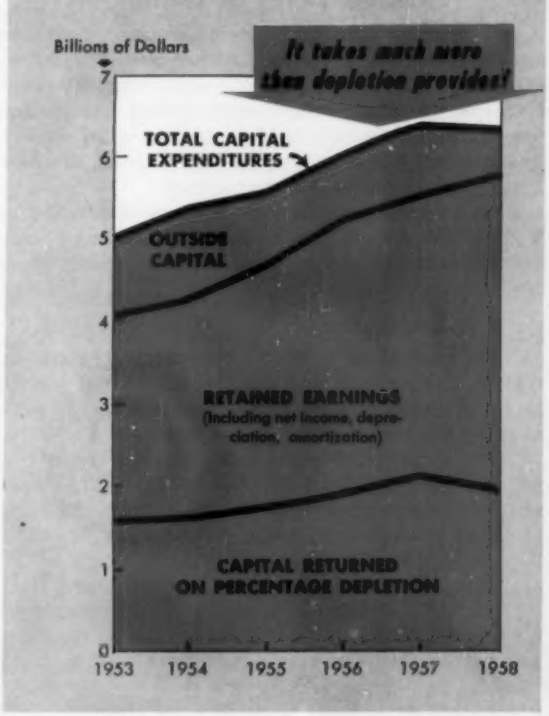
Neither point will stand investigation.

First, any expected revenue from added taxes would be subject to much shrinkage. Too, the added cost of these taxes to the oil industry would be only a fraction of the full impact on the industry's ability and its incentive to find oil and gas to replace what we are not consuming.

To begin with, what would a reduction in percentage depletion to 15% mean in increased taxes to be paid by the industry? For an estimate, consider the testimony given by the Treasury's Dan Throop Smith.

The gross increase in domestic taxes, he estimated, would amount to $390 million per year based on current figures. But this $390 million figure is only a starting point.

What it takes to keep the oil industry going-



Smith noted quickly that this sum would be reduced by about $65 million annually because of lower oil-company dividends under a new depletion rate.

Smith also said his estimates made no allowance for the indirect effects on production or prices from any change in the depletion allowance. He said it is likely that significant changes would occur, but their nature and magnitude are not subject to statistical projection.

He was correct. These indirect effects cannot be pinpointed statistically. But their magnitude can be gaged by reasonable assumption.

The money paid out in dividends amounts to less than 20% of total income in this industry. The cutback in dividends required by an added $390 million tax load would extend as well to money spent in exploration, and drilling and developing new reserves. It is entirely valid to assume that the loss in income tax collected from labor, drilling contractors, oil-field suppliers, and service companies could be several times the $65 million lost through lower dividends alone. This indicates that the actual net return to the federal treasury might be less than half the $390 million gained by cutting depletion.

The oil industry, however, would have to pay the full $390 million in taxes and probably more, even though the Government, because of losses elsewhere, would not wind up with nearly so much.

A reduction in depletion would not be followed by a cutback in production. We have today an excess capacity which the industry would be able to draw upon for a few years, regardless of its efforts at replacement. Demand is expected to continue to rise, so the total tax bill would undoubtedly amount to over $400 million this year and even higher during the next few years to come.

Three Ways of Living

There are three recourses in meeting this added cost of operation. If the industry were to continue its search for oil and gas without abatement, it would need either to raise prices to compensate for this added tax load, or it would need to borrow more money to carry on. Barring these two possibilities, it would have no other choice than to retrench.

Let us look at these three avenues of reaction to a depletion cut and gage their probabilities. Some valid deductions are in order, without indulging in speculative predictions.

1. Raise Prices

The chances of a direct price increase would be remote. Certainly oil and gas prices have not reacted to rising costs in recent years. In this industry, price is set by the law of supply and demand.

The recent labor settlements, which will cost the industry an estimated $128 million this year, caused no price increase whatever. Rising imports, added to closed-in production at home, have, in fact, caused a definite softening in prices over the past year.

Some oil products such as gasoline, diesel fuel, jet fuel, LPG, and lubricants have no competition from outside the oil industry. But the internal competition arising from a current excess in manufacturing capacity has held them firmly in line.

Definite price ceilings are imposed on other products. Home-heating oil and heavy fuel oil compete directly with gas and coal. Gas, in turn, is subject to federal price control when it is transported across state borders.

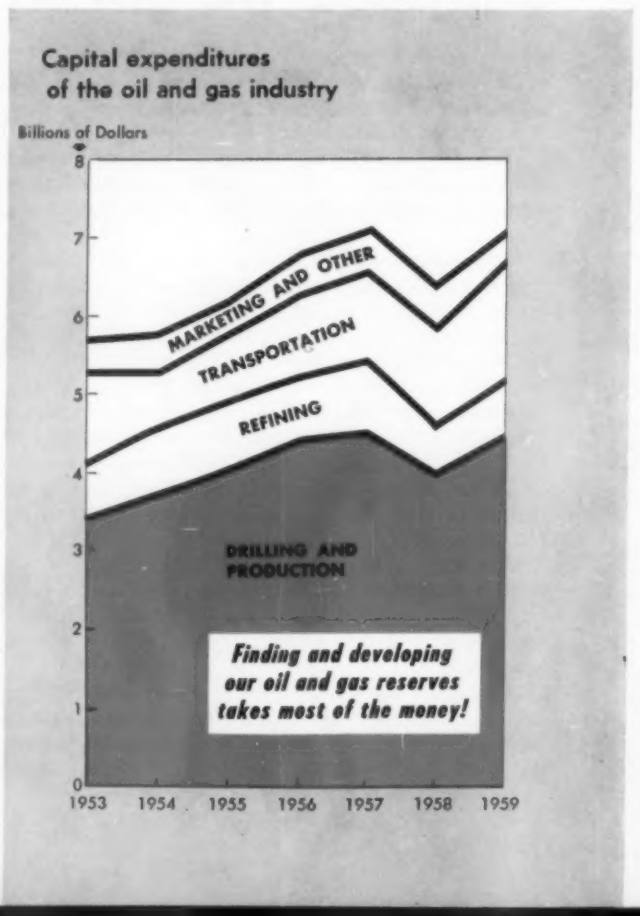
While the industry might be inclined to pay its higher taxes by increasing prices, it almost certainly could not make them stick. The very mechanics of free enterprise which have held oil prices to a lower-than-average level throughout the years would continue to apply.

So, for a period, the consumer would feel no effect on his gasoline bill. But the long-range effect would be something different. Lacking the funds to offset higher taxes, the oil industry would soon enter a period of shorter supply.

Then, the price reaction could well be swift and broad. Economists are acquainted with the repercussions which ensue when a delicate balance of factors is upset in such a major industry as oil. Without attempting to measure their effect statistically, they will agree that overdue price rises might well bring about a wide swing of the pendulum.

Assume for a moment that prices **were** raised to offset the full effect of the estimated $390 million added tax bill presented the industry. Since the industry pays income taxes amounting to 52% of net income, it would need to realize more than double that amount in gross revenue. A price increase grossing $810 million more, less the $420 million additionally paid in corporate income taxes, would just offset the $390 million in taxes due to a depletion cut.

The increase would have to be passed along pri-



marily to gasoline. Assuming this highly improbable price reaction, the cost of gasoline would need to rise 1½ cents per gallon. This represents nearly $11.00 to be added to the average motorist's annual fuel bill. But it would mean much more than that, since the price of gasoline is added to the cost of virtually everything we buy today.

Since this initial price rise is not an immediate prospect, the American motorist would be granted a breathing spell on this price increase. But once the period of oversupply had passed, the delayed action on prices could well press gasoline prices upward 3 cents a gallon or more.

This possible reaction, coupled with the planned loading of additional excise taxes might spell the end of the industry's long record of holding the line on gasoline prices.

2. Borrow More Money

With no recourse to higher prices, the industry would need to borrow more heavily to keep up the pace. How would it fare in the capital market? Quite poorly, from all indications.

Under the present depletion provision, additional capital has been available from outside the oil industry. This moderate flow of new money will continue, say the bankers, so long as depletion remains at 27½%. But let it be cut, and oil earnings would grow less attractive to investors. The Journal believes that the industry thus would find itself cut off from many sources of outside capital.

This loss of outside money would be greater than many realize. Last year, the U. S. industry invested an estimated $6⅓ billion in all of its divisions, of which $4 billion went for finding and developing new oil reserves.

This money came from three main sources: (1) Capital returned in the form of depreciation, depletion, and amortization; (2) retained earnings; and (3) outside capital acquired through sale of stock, debentures, and long-term debt. Late last year it was estimated that $1½ billion came from these outside sources.

With many money sources lost, the oil industry would be unable to maintain its present rate of operations.

3. Cut Back Operations

With little likelihood of compensating price increases and with borrowing power deflated, the industry would face one recourse — a drastic budget slashing. And the magnitude of this retrenchment would probably be far greater than the mere loss of $390 million in additional taxes.

For still another reaction would be set in motion. At reduced depletion the incentive for directing available funds into the search for new oil and gas would be weakened. The historic 27½% level has been more than an incentive. It has amounted to a compelling force which kept the industry on a treadmill, reinvesting in effect, all of its retained earnings, and paying dividends out of borrowed money.

This high cash flow is not matched in any other major industry. Since roughly one-third of the yearly turnover in cash represents capital returned in the form of depletion, depreciation, and amortization, a cut in depletion would cause the industry to bleed to death if it maintained its oil-finding pace.

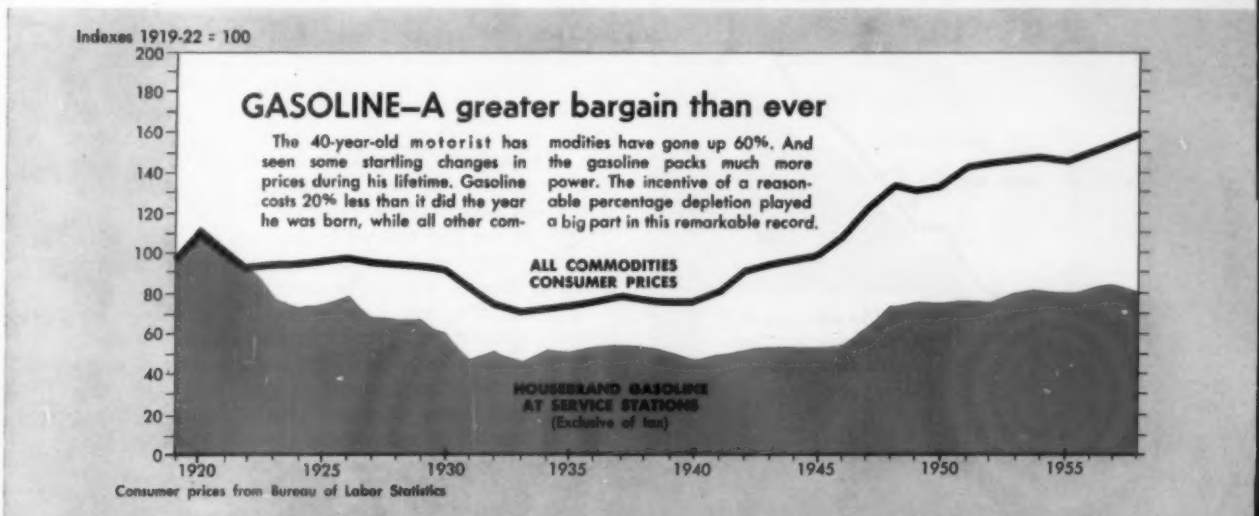
The Search Would Slacken

Although impossible to pinpoint, these ramifications compound one another to indicate only one possible outcome. The exploration effort needed to find tomorrow's oil and gas would be spiked. And the effect would be immediate.

It is fruitless even to attempt an estimate of the multiple effect of a reduction of $390 million in the return of depletion capital. So, let us consider first, what retrenchment would accrue to that amount alone.

Oil finding is a most unusual business. To discover the raw material it uses, the oil industry must drill wildcat wells. There is no other way. Great progress has been made in the scientific location of places where oil **should** or **could** exist, but no method has yet evolved to indicate its actual presence. A well has to be drilled.

It is definitely more diffficult to find oil today than ever before. Of the 210 major oil fields in the U.S., 208 were found prior to 1953. A major oil field is one with an ultimate recovery of 100 million barrels or more.


Indexes 1919-22 = 100
200
180
160
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GASOLINE—A greater bargain than ever
The 40-year-old motorist has seen some startling changes in prices during his lifetime. Gasoline costs 20% less than it did the year he was born, while all other commodities have gone up 60%. And the gasoline packs much more power. The incentive of a reasonable percentage depletion played a big part in this remarkable record.
ALL COMMODITIES CONSUMER PRICES
HOUSEBRAND GASOLINE AT SERVICE STATIONS (Exclusive of tax)
1920
1925
1930
1935
1940
1945
1950
1955
Consumer prices from Bureau of Labor Statistics

The last one to be found was Utah's Aneth field in 1956. In terms of production, these giant fields represent a continuously decreasing per cent of total U.S. output. In 1945 there were 109 of them, producing 51.7% of total U.S. production. Today they are producing only 44% of the total. This means that more and more we depend on the smaller fields for our daily oil needs.

Fewer and fewer of these giant fields are being found today. Fortunately, the cumulative effect of the small fields has been sufficient to offset production and to keep our national reserves at an adequate level. But as production mounts at the rate of 4% per year, the industry must step up its search.

This can only be done by more wildcat drilling. A wildcat is an exploratory well drilled on a new prospect, at least 1 mile distant from proven production. Of these wildcats, only 11% or roughly 1 in 10 can be expected to find any oil or gas.

The chance of finding oil is becoming even slimmer. Since 1954 there has been a steady decline in the number of new oil fields discovered in the U.S. A growing number of these 1-in-10 successes is turning up gas reserves instead of oil.

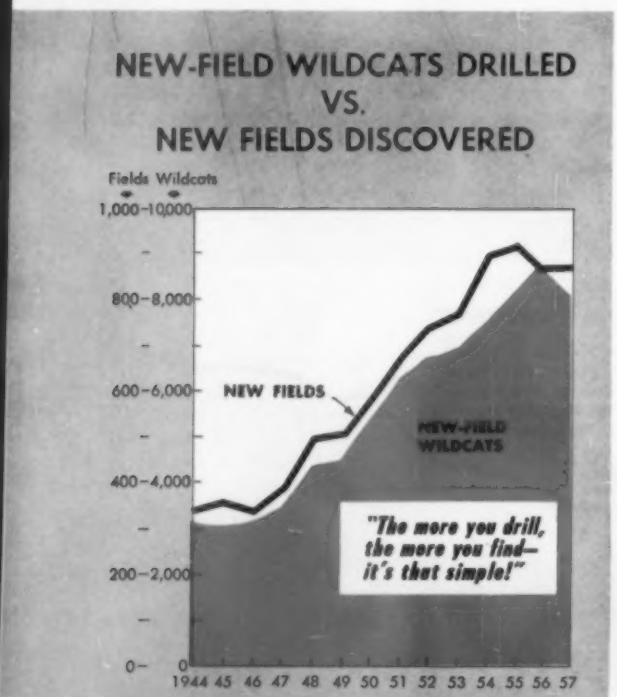
This factor, accompanied by a parallel decline in the reserves per new oil field discovered, poses a double threat for the oil industry. The only way this double decline can be offset is to drill more and more new-field wildcats.

The Price of Depletion

If depletion percentage were cut from 27½% to 15%, $390 million a year would be immediately removed from retained earnings. This would call for an immediate decision to reduce exploration. History shows that the first cuts are always made in this department. The industry historically maintains a backlog of development drilling which is relatively inflexible. Once a new field is discovered, companies are forced to drill their newly proven acreage to protect their investments and to meet contract commitments.

Undoubtedly most of the $390 million (at least 75%) would be made up from cuts in leasing, geophysical prospecting and wildcat operations. The average cost of a wildcat well today is at $80,000. This means that we would see about 3,600 fewer wildcat wells drilled during the first year of a depletion reduction.

During the 3 years 1955, 1956, and 1957, according to the American Association of Petroleum Geologists, 8,275 new-field wildcats were drilled per year. A slash in depletion, therefore, could well mean a drop of 43% in new-field wildcatting. Could we, in the face of dwindling reserves per well drilled, and in the interest of national security, afford such a backward step?



Reserves Would Suffer

What would this mean in new reserves? In the oil industry, a simple way of measuring exploration success is to figure the barrels of oil found for each foot of hole drilled. In the 1950-57 period, the 8,275 wells drilled each year found only 14 bbl. on the average. This record compares with 31 bbl. per foot in the period 1944-50.

Between 1950 and 1957 the average wildcat well depth was 4,448 ft. If we drill 16,000,000 fewer feet in exploration for new oil, we will find each year 224 million fewer barrels of new oil.

The oil industry's proud record has been that of finding each year more new oil than was actually consumed that year. This was necessary to stay even. For oil discovered today is not available in full, today. It takes months and even years to develop a newly discovered field to the point where its full productive capacity is available to fuel the nation's cars and heat its homes.

As a result, the oil men must continue to find more oil every year than they currently produce, to meet the higher demands of future years. A reduction of even 224 million barrels in new discovery each year would completely upset this necessary balance. We would find ourselves running out of future oil availability at an accelerating pace.

This time lag is an important one to consider. Some advocates of a depletion reduction feel that it would be harmless to tamper with this complex balance on a "try it and see" basis. What they do not realize is this: Once set in motion, the chain reaction of a depletion reduction could not be halted. This historic balance is not be restored later by higher prices, nor even by reinstating the 27½% level.

We do not find new oil by pushing a button. What happens today will be reflected inexorably tomorrow, and the damage cannot be corrected.

For example, any slowing down in activity means loss of research men, field engineers, superintendents with oil-country know how. It's not a matter of hiring more men from employment offices when operations pick up and laying them off when business slackens. The oil industry is much more complex than the sand and gravel or mining industries.

The Little Man Would Quit

One compelling aspect of reducing depletion has been misunderstood or disregarded by those who would tamper with oil's economics. An immediate result would be a widespread sale of producing properties.

From the seller's viewpoint "getting out" would become much more attractive. Even today, under the 27½% provision, some independents find that the rising costs of finding new oil make the effort to replace his depleting oil assets unattractive. Sales of small producing properties are on the upswing. Facing a serious slash in the return of their existing capital, many more independents are going to be forced to take the sales route to protect their investments.

On the other side of the picture, companies with refineries who need to purchase oil, will be able to see an oil shortage building as lower depletion cuts back new exploration. The growing list of prospective sellers will undoubtedly be matched by a growing list of prospective buyers, anxious to protect their future commitments.

It is fruitless to attempt to measure this trend. But the facts surrounding the sale of a single example property certainly point to its direction.

Consider what would result if a 10-million-barrel reserve of oil were retained by its discoverer, or were sold. If retained, the original holder would find his tax bill increased by $1.6 million dollars on a reduction of percentage depletion from the present 27½% to the 15% level. Here's how it would be figured, in millions of dollars:

	27½% Depletion	15% Depletion
Gross income (10,000,000 bbl. at $3)	$30.0	$30.0
Lifting costs (10,000,000 bbl. at $.54)	5.4	5.4
Severance taxes (at 5%)	1.5	1.5
Depreciation	4.4	4.4
Depletion (effective 25% at 27½, 14% at 15)	7.5	4.4
Total deductions	18.8	15.7
Taxable net income	11.2	14.3
Income tax (at 52%)	5.8	7.4

If this operator were considering the recourse of selling his property under the present depletion provision, a look at his tax load under the proposed reduced depletion would give him an added incentive to sell out and take his capital-gains tax.

Let us assume that he found a buyer who was willing to pay $15 million for the entire property. This total price would consist of $10.6 million for the oil itself, plus $4.4 million for equipment, buildings, and other depreciable assets. The price of $1.06 for a barrel of oil in the ground is conservative in view of the current value.

The seller has a long-term capital gain of $9.7 million on which he pays a capital-gains tax of $2.4 million. Of the $15 million price to the buyer, the revenue agent agrees that $4.4 million applies to depreciable assets, and $10.6 million applies to depletable assets.

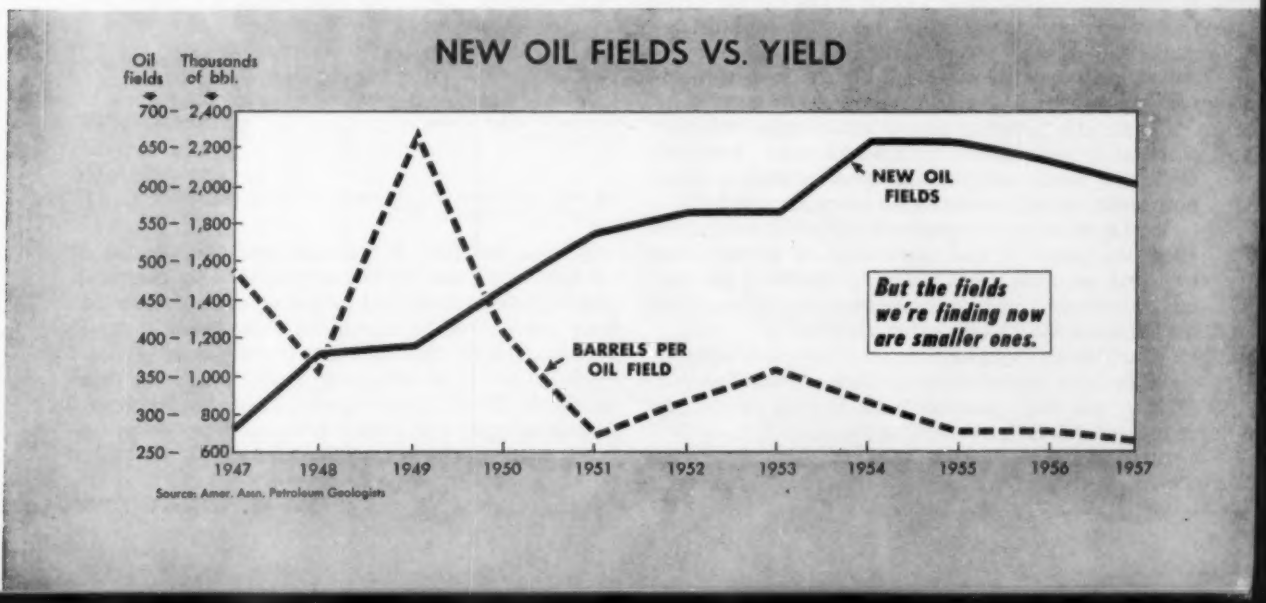
When operated by the discoverer, the cost of finding and developing the property represented a lower figure than the percentage depletion deduction under 27½%, so percentage depletion was taken. This is the case in most properties still in the hands of the parties which found and developed them.

But the buyer has paid $10.6 million for his oil and can elect to take cost depletion at the rate of $1.06 per barrel of oil as it is produced. Under a 15% depletion rate his percentage depletion deduction would amount to only $.44 per barrel. Hence, the choice is obvious.

The buyer's income taxes will then be determined as follows in millions of dollars:

Gross income	$30.0
Lifting costs	5.4
Severance taxes	1.5
Depreciation	4.4
Depletion (cost basis)	10.6
Total deductions	$21.9
Taxable net income	8.1
Income tax	4.2

How would the Internal Revenue Service fare if a depletion reduction forced this sale? It would receive



$2.4 million from the seller, plus $4.2 from the buyer for a total of $6.6 million in income taxes over the producing life of the property. This is actually $800 million dollars **less** than the tax which would have been paid, had the property remained in the hands of the developer.

Most properties today are bought and sold subject to an oil payment. The buyer agrees to pay the seller in installments, out of the oil the buyer produces and sells. This procedure crowds the bulk of the "cost depletion," actually the oil payment, into relatively few years, leaving percentage depletion for the latter years.

Under this provision the gross tax revenue from the property would be even less than for the outright sale outlined here. Any reduction in the depletion provision will accelerate this trend toward sales of properties without a shadow of doubt. Those who advocate a drastic depletion reduction from 27½ to 15% should take this further shrinkage factor into consideration.

But this is only one of the consequences which would work to the nation's detriment. Another aspect, also largely ignored, is the effect of these property sales on the historic industry balance between large and small operators. It is generally granted that the smaller oil man or company has contributed largely to the discovery of oil and gas here at home.

Some of these "independents" do their exploration and wildcatting entirely on their own. More of them operate with financial support from major oil companies and from individuals and companies outside the industry. A depletion cut would dry up much of this financial support, hastening the independents' departure from the business of finding more oil.

The exodus would move producing properties in one direction only. Existing reserves would tend to pass from smaller to larger holders. In this respect, a cut in depletion would strike hardest at the independent oil man, hailed as the industry's most aggressive oil finder.

Depletion and conservation

The role percentage depletion plays in maintaining our secondary and stripper reserves has received little or no attention. This is true largely because it defies specific statistical evaluation.

But any reduction in depletion would certainly slow down this vital segment of the producing industry. When we think of the return of capital for reinvestment in new reserves, we too often think exclusively of exploration and wildcatting for yet-undiscovered oil and gas.

One of the most important contributions to this nation's security is the industry's increased know-how in getting more oil out of the fields we have already discovered. It is called secondary recovery, because it takes another crack at known reserves and results in getting more oil to the surface.

An erosion of capital returns brought about by depletion reduction would also affect this secondary-recovery effort. It takes capital to get this added increment of oil in place in the ground. If less capital is available, a new look will be taken of the prospects of payout in new water floods, pressure-maintenance and repressuring projects, miscible-phase operations, and the newly developed fire floods or thermal-recovery programs.

These efforts toward greater conservation will have to stand or fall under a new set of rules. With less money to begin with, and a lower payout in prospect, more or such conservation programs will fall.

Today these "new" reserves have grown to a significant percentage of total recoverable oil in this country. Our reserves presently being produced by secondary-recovery and pressure-maintenance methods now account for 13 billion barrels of oil.

Our stripper production is also important. Stripper wells, by loose definition those which produce less than 10 bbl. per day, produce from a total recoverable reserve of 4.2 billion more barrels.

It is significant to note, however, that these estimates of recoverable oil are based on a continuation of percentage depletion at 27½%.

Secondary-recovery and stripper production is not a high-profit operation. Throughout the life of such reserves, the net income is generally so low that it becomes the limiting factor on depletion. Half of net income is less than even the effective 23% of gross revenue in most cases.

But percentage depletion does play a part at some time in nearly all secondary-recovery projects. As an example, consider this typical five-spot water flood property now in its eighth year of operation.

Analysis of a Typical Water-Flood Project Showing the Effect a Reduction of the Depletion Allowance to 20% Has on Net Profits

Total earnings		$7,300,000.00
Well expense	$1,915,000.00	
Lease general expense	200,000.00	
Cost of abandonment	15,000.00	
Dry hole losses	10,000.00	
Overhead	425,000.00	
Cost of development	1,825,000.00	
Ad valorem tax	215,000.00	
Net profit		$2,695,000.00
FIC tax-depl.—27½%	1,075,000.00	
Net profit after taxes		$1,620,000.00
FIC tax-depl.—20%	1,265,000.00	
		$1,430,000,00
Per cent reduction in net profit by reducing depletion allowance to 20%		12%

During the first 2 years of operation, depletion was no factor. The flood lost money. This is typical since high investment and operating costs precede the rising recovery of oil during the early years of these projects. During the third and fourth years, production rose to a point where net profits were more than double the 27½% gross figure. Thereafter, declining production again ruled out percentage depletion as net profits took over as the limiting factor.

From this typical example, the operator derived a lease-by-lease evaluation of what effect a reduction to 20% depletion would have had. The whole operation would have cost an additional $190,000 in taxes. To date this represents a 12% reduction in net profit after taxes.

Would this have ruled out this project in the first place? Possibly not, since it still would have shown some profit. But would it have shown as much return as some alternate investment?

The decision to undertake any secondary-recovery project is based not upon whether it will make a profit, or lose money. It hinges on whether it will provide a **better** return than some other investment possibility. With a lower depletion, the thousands of decisions faced each year are certain to be altered to some degree—against undertaking one of the industry's prime conservation measures.

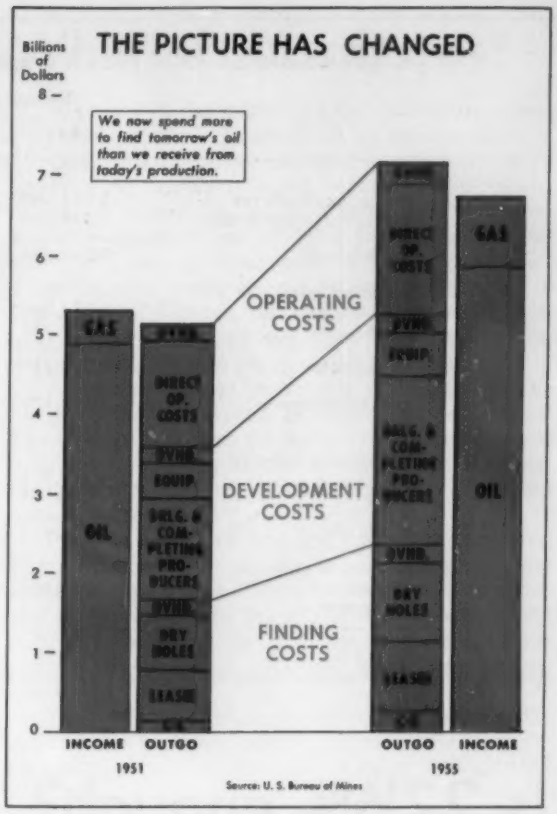
It isn't a matter of going back after this oil at some hypothetical future date when the price of oil may justify the effort. The time to initiate secondary-recovery methods is before a field is abandoned. Once abandoned, or even permitted to become marginal stripper properties, much of the benefit of secondary recovery is lost.

What about strippers?

Again, the effect of a reduction in depletion on stripper properties has been practically ignored. Granted, the low profit margin makes 27½% depletion academic, so long as wells are operated at low profit.

But many stripper properties are kept in operation with the ultimate expectation of applying secondary-recovery methods. With a higher tax structure in prospect, many operators feel that they would abandon plans for secondary recovery. They would abandon more than that. The marginal properties would be dropped, and with them hundreds of millions of barrels of oil not economically recoverable.

The full impact of a reduction in depletion cannot be accurately assessed in this respect. But a team of experts close to the secondary-recovery picture estimate that reduction from 27½% to 15% would bring about a net loss of 100 million barrels annually over the next 5 years in these stripper properties alone.



The same group estimates that in the long run production by secondary-recovery methods might be reduced 40% by a substitution of 15% for the present 27½% depletion formula. Those who advocate this upheaval in the oil industry's conscientious effort to raise the recovery of domestic reserves we have already found, must weigh their actions in the light of conservation, as well as future national security.

How about a sliding scale?

Last year Congress considered and defeated a proposal calling for depletion cuts based on company size. The individual or corporation grossing less than $1 million would retain the full 27½% rate. Those in the $1 million to $5 million bracket would be reduced to 21¼% and all larger companies would be further cut to 15%.

However well-intentioned, this device to protect the small independent has some major flaws. By penalizing "bigness" as such, it would counter a basic intention of the depletion principle.

The incentive to reinvest capital funds in the search for more oil would be lessened, for the successful company could find itself penalized with a lower depletion rate. The right of the small oil man to expand should not be subjected to such an impediment.

Another aspect, too little stressed today, is the contribution of the larger members of the industry to its technology. Most of the basic and applied research which has fostered greater conservation and more efficient exploration stems from this source.

Research programs are high-cost items. Only the major company can afford them. And the need for more research is felt today as never before to offset the rising costs of finding and developing our domestic reserves of oil and gas.

The small independent has an excellent discovery record. But an unknown and largely unsung share of that credit goes to the larger companies who regularly back these oil finders with capital funds. A sliding scale on depletion would in short time dry up some of this support.

Expenditures and Net Value of Oil and Gas Operations

(Thousand dollars)

	1948	1951	1953	1955
INPUT				
Finding expenditures	1,054,600	1,600,980	1,955,380	2,268,390
Developing expenditures	1,528,354	1,946,190	2,340,985	2,859,075
Subtotal	2,582,954	3,547,170	4,296,365	5,127,465
Operating costs:				
Oil	1,214,262	1,516,295	1,698,902	1,877,850
Gas	99,257	96,978	145,595	143,484
Subtotal	1,313,519	1,613,273	1,844,497	2,021,334
Total expenditures	3,896,473	5,160,443	6,140,862	7,148,799
OUTPUT				
Net value to industry:				
Oil	4,490,871	4,862,136	5,401,018	5,884,215
Gas	286,101	465,451	660,501	836,324
Total	4,776,972	5,327,587	6,061,519	6,720,539
Net annual balance:				
Positive	880,499	167,144	.....	.....
Negative	.....	.....	79,343	428,260

Source: U. S. Bureau of Mines.

Is 27½% enough?

The full, conscious intent of Congress in originating 27½% depletion, and in sustaining it for 34 years, was twofold:

It permitted a proper return of capital on the basis of discovery value, and it assured adequate funds to continue exploration and development of new oil to replace that consumed each year.

The incentive is still regarded as adequate. But today the funds represented by this return of capital are no longer sufficient to keep up the search. Some critics of the industry believe that the money which integrated oil companies receive from depletion represents an excess which they can apply elsewhere, in investments for refining, transportation, and marketing facilities.

There is no such excess. In fact, the industry is not only plowing back all of this returned capital in searching for new oil reserves, it is adding twice that amount from other sources.

In recent years the petroleum industry has invested more in future oil and gas reserves than it realized from current income from production. These interesting facts were revealed in a study presented late last year before the World Power Conference in Montreal by C. C. Anderson, Chief Petroleum Engineer of the U. S. Bureau of Mines.

The growing demand for new capital investment arose from increased exploration and development needs, not the cost of bringing oil and gas to the surface. Anderson pointed out that operating costs per barrel of oil and per M.c.f. of gas due to more efficient techniques actually show a reduction between 1954 and 1955.

Anderson's study is summarized in the table above. The balance sheet for the entire domestic oil and gas industry shows a significant trend. The industry as a whole realized a net return of $880 million in 1948. But the sharply rising investment in finding and developing new reserves reversed the picture between 1951 and 1953.

During 1953 and 1955, the industry actually spent more in its producing division than it realized in gross returns. This means that money was diverted **toward** the production of oil and gas.

How did depletion fit into this picture? Maximum depletion, limited by the 50% ceiling of net income could not have exceeded $1.6 billion that year. But money spent to find and develop new reserves amounted to $5.1 billion, more than three times that figure. For every dollar of capital returned under depletion, the industry spent two more just to maintain the level of its underground capital.

Since the industry is spending 2 dollars for every dollar returned on percentage depletion, where is the extra money coming from? Company earnings are being returned at an ever-increasing rate. In the integrated industry, expenditures for finding and producing oil and gas take almost three-fourths of total domestic outlay. Further, the ante each year has grown faster than for any other division.

In terms of today's dollars, the industry spent $460 million in 1938, $2,100 million in 1948, and will invest $4,150 million this year. Even in constant dollars, this investment has expanded over 3½ times in 21 years.

This rising rate of investment in tomorrow's oil has not been matched—or even approached—by the increase in net income. A survey of 21 major oil companies' operations over a recent decade shows net income rising just 60% from 1947 to 1952. From 1952 to 1957, net income gained only 50%. Over the full 10-year period, net income related to gross earnings declined from 11.37% to 9.83% for the 21 companies.

This has brought about a change in the financing pattern of the oil industry in this country. Companies have gone outside for new capital in increasing numbers. During 1956 and 1957, the U. S. oil industry obtained more than 1 billion dollars each year to help finance operations at home and abroad. The inflow of capital reached about $1½ billion last year.

In prospect are even greater capital needs. With outlays for the whole industry expected to run a billion dollars per month for the next 5 years and 1¾ billion dollars per month for the succeeding 5 years, an increasing flow of outside capital into the oil industry is evident.

Retained profits, depreciation, depletion, and amortization will not fully carry the load if the projected needs of this country are to be met with available domestic supplies.

This assumes, of course, that the federal Government will not permit oil imports to take over a predominant share of our needs. The Government's position today is firm. It considers a healthy, growing domestic industry necessary in the interest of national defense.

What of substitutes?

In projecting the extended future, alternate sources for petroleum products must also be considered.

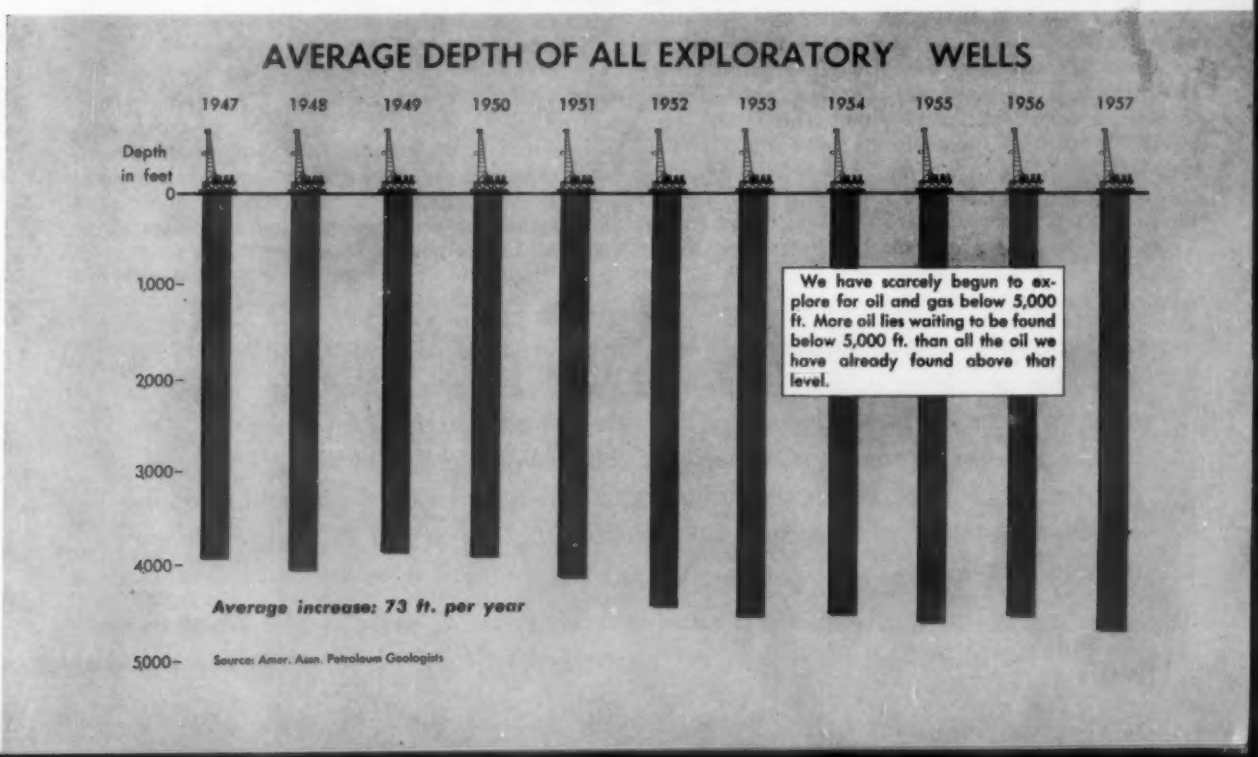
Shale oil is a definite successor to petroleum, when its recovery and processing becomes economically practical. Technically, we now know how to recover this new source of energy. But the capital requirements and the operating costs involved in bringing it to processing plants are still beyond those needed to find more oil and gas. In addition, shale oil will require more costly processing than petroleum, to produce the fuels we now use.

Atomic power also looms as a probable substitute for petroleum, particularly in stationary power plants. This new age will come gradually, however, and atomic power as a substitute for the mobile sources of energy represented by gasoline, diesel fuel, and jet fuel is even further in the future.

It would be impractical and downright hazardous to assume that petroleum can be replaced in any substantial volume in this country for many years to come. The substitutes on the horizon now or in the talking stage all have a very high price tag which makes them entirely uneconomical presently as a mass energy source.

Those who feel that petroleum has had its day and that we no longer need to maintain the incentive for finding more of it, are guilty of fuzzy thinking. We have not even approached the time when we can slacken the effort to find more and more domestic reserves of this all-important source of energy.

Until that day, capital must be made available to maintain this energy supply. Authorities in financial circles assure this supply of capital, provided the incentive of depletion is not removed.



What of oil's future?

The statistics of finding new oil, even under the present workable program, might appear to paint a grim picture of tomorrow's supply, 27½% depletion notwithstanding. But we are not running out of oil. And under a continuation of the historic incentive set up by Congress, we can look forward to a sufficient domestic supply for many years to come.

Geologists across the land are firm in the belief that as much oil remains to be discovered between depths of 5,000 and 10,000 ft. as has already been found **above** 5,000 ft. By a wide margin, most of our oil today is produced from depths shallower than 5,000 ft. Our exploratory wells are being drilled deeper each year. Yet, the average depth of all such wildcats has still not reached 5,000 ft.

The deepest well in the world was drilled last year in Pecos County, Texas. It reached 25,340 ft. and was a major milestone in oil history. Its cost has been estimated at more than $2½ million.

This deeper drilling outlook emphasizes a cost structure peculiar to the oil industry. As drilling goes deeper, costs per foot balloon, and the rate of increase grows with each foot. Bigger equipment, more expensive supplies and materials, and extra services are needed.

Thus a 10,000-ft. hole costs much more than twice as much as a 5,000-ft. one. And a 20,000-ft. hole may cost 10 times that of a 10,000-ft. well.

Therefore, to achieve a 10,000-ft. average drilling depth for exploration, the wildcatter must be given more incentive—even under present depletion provisions. Prices must rise or the increased costs of drilling—aside from inflation—will discourage his risking capital on a not-too-attractive venture.

To remove even part of his present incentive might prove disastrous. It could send this country galloping down the road to a "have-not" position in this vital energy source.

Given this assurance, the oil industry stands ready to deliver, as it has in the past. Oil finders are moving into virgin areas which show promise of oil and gas.

Billions of barrels undoubtedly lie waiting in stratigraphic traps which cannot now be found by any surface-exploration method. But we may be on the threshold of a breakthrough on this important front. Given a technique to indicate the presence of these potentially prolific oil deposits, we could reexplore the entire nation with renewed possibilities of discovery.

We have not yet explored all of our geographical area with the tools we now have. Obviously, we have looked first in the areas which are least costly to explore. But the waters of the Gulf Coast and the far reaches of Alaska serve as good examples of new oil provinces of considerable promise.

We need also to look deeper in our established oil provinces. The industry maintains an aggressive research program aimed at reaching these more remote sources of petroleum.

Our prospects for finding more oil here at home were summed up recently by Morgan J. Davis, president of Humble Oil & Refining Co. Here are some of his points:

... The United States is not poor in petroleum reserves or resources,

... Reserves are at an all-time high and we have an adequate working inventory for current needs,

... Our present reserve producing capacity of 3,000,000 bbl. per day can be sustained for many years if the industry continues its aggressive exploration and development program,

... We have sound basis for believing that discoveries and reserves of petroleum can keep pace with increasing domestic requirements for a long period,

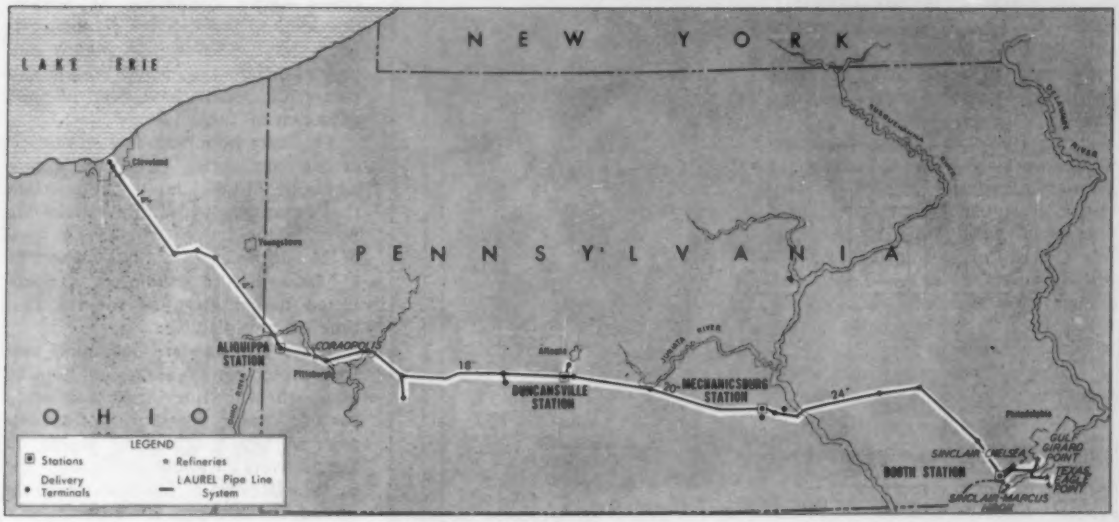
... In the next 20 years, with little allowance for increased recovery due to improved techniques, we can add at least 70 billion barrels of supply to the 30 billion we now have,

... The industry can maintain the reasonable cost of domestic oil and gas compared with other energy sources, so long as it continues its technological progress and is assisted by regulatory agencies to be as efficient as it knows how to be.

He saves his biggest point for his last:

... "The prospects for the domestic petroleum industry could be changed drastically, however, by unwise actions by state regulatory agencies, the federal Government, or the industry itself, on such matters as conservation, percentage depletion, and import policy. It has taken a long time to build the present vigor of the domestic petroleum industry, and such vigor, once impaired, cannot quickly be restored."

Support of depletion does not require a defensive approach. Rather, those who, by attacking it, would unwittingly devitalize this critical source of the nation's strength, must themselves be called upon to defend their position. Depletion is a legally sound principle. And the incentive provided by 27½% depletion for oil and gas serves the nation as a whole. It assures a bountiful supply of low-cost energy to support our standard of living and to guarantee our national security.



PHILADELPHIA-CLEVELAND line, tapering from 24-in. to 14-in., transports products from Sinclair, Gulf, and Texaco refineries westward.

Laurel products line is first to use 24-in. pipe

New line will provide cheaper transportation from Philadelphia area refineries to large Pennsylvania and Ohio markets

PAUL REED
Pipeline Editor

IN THE DESIGN and building of Laurel Pipe Line Co.'s products system across Pennsylvania and Ohio, conditions have been met which are not usually encountered in the Midwest and the Southwest.

Such a large-diameter system could only be possible in areas of relatively heavy consumer demand. To serve it, the line had to traverse densely populated municipalities as well as mountains and broad rivers. The impact of Laurel's large throughput possible with large-diameter pipe will have an important effect on products transportation and marketing patterns in the Northeast.

Initial throughput will be approximately 90,000 bbl. per day. Within 5 years, throughput is expected to be 150,000 bbl. per day.

Design of initial installation provides for throughput from the upstream end of the line of 276,000 bbl. per day. Eventually this could rise to 396,000 bbl.

Laurel is the first to use 24-in. pipe for a products line. Design of the system is outstanding in advancing pipeline techniques for low per barrel-mile costs for handling very large volumes in the future.

Information for this article was obtained from William J. Wilkins, president of Laurel Pipe Line Co., and his staff during a week's visit to the system during construction.

The $50,000,000 Laurel system has 429 miles of main line of 24, 20, 18, and 14-in. pipe (plus laterals), served by initial pumping units of approximately 13,000 hp. at four pump stations. This system from the Philadelphia refining area via Pittsburgh to Cleveland was built in 1958.

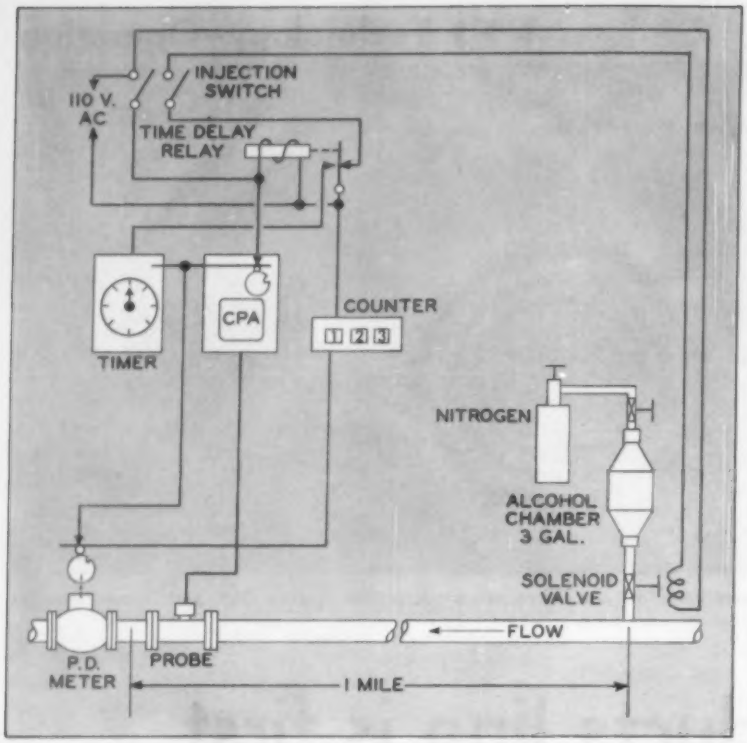
The line is owned 40% by Gulf, 35% by Sinclair, and 25% by The Texas Co.

The system has been designed through the collaboration of engineering staffs of the three stockholder companies. Some of the notable features of the system discussed in this article are: remote control of one main-line station by the dispatcher; capacitance detection of interfaces for monitoring and calibrating; remote control by dispatcher of volume and rate of flow of deliveries at takeoff points; scheduling of pumping units for flexible operation and power economy; improved tank foundations and provisions for back-pressure control.

The system will handle 16 products for delivery at 18 separate metering stations at takeoffs to 23 shippers' terminals.

The system was originally designed for 11,500 bbl. per hour throughput from Booth. Eventually this will increase, with additional units at initial stations, to 16,500 bbl. but without addition of intermediate stations.

Custody of products is taken by Laurel at meters in the refinery yards. The refineries of three shipper-owners in the Philadelphia area deliver to



"MEASURED MILE" installation determines volume flow of liquid to verify accuracy of p.d. meter. Alcohol is injected into the pipeline, transported a fixed distance, and detected by the probe connected to a capacitance product analyzer. The known volume of oil in the line is compared with the meter counter.

Booth, the initial station in the following ways:

- Refineries at Girard Point (Gulf) and Eagle Point (Texas) deliver through a common 24-in. line.
- The Chelsea tank farm (Sinclair) pumps through a 16-in. line.

Products from these refineries either go into tankage or directly into the Booth station suction.

At these refineries, deliveries are measured by positive-displacement meters. Readings are indicated continuously, logged hourly, and on demand at the Camp Hill dispatching office. Meter reading of inbound and outbound flow from Booth is similarly indicated and logged at the Camp Hill office.

Pump Stations

All four initial stations are of outdoor type with only a canopy over the pumping units. Controls are housed in small pressurized buildings. Pressurizing is done with air drawn through a stack from a point 28 ft. above the ground so as to avoid dust and possible explosive mixtures.

Sequence-control starting of manned stations is initiated by push button on the station console in this pressurized control room where starters for equipment are also housed.

No two stations on the system are alike. Each of the four stations operates under conditions of terrain, throughput, and deliveries which differ widely. Each station pumps into pipe of different diameter. Present and future pump units have been planned as shown in Table 1.

Totals for both main line and booster units are: initial, 13,100 hp.; future additions, 13,800 hp. These mean that eventually when future units are installed the system will have a total of 26,900 hp.

Motors are of a new weather-protected design, installed for the first time on any pipeline.

These are standard induction motors protected by a special housing equipped with filters and baffles to exclude water from a hard-driving rain. A fire hose can be played on the louvers without affecting the motor. Because of the extra space required, the housings are 8 ft. tall.

The variations in operating conditions at the four stations are indicated as shown in Table 2.

Flexible Pumping Schedules

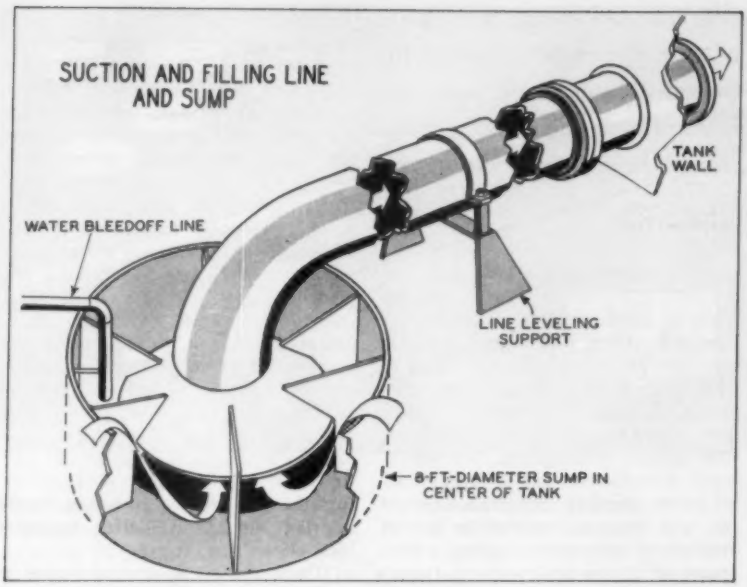
This is believed to be the first products line on which three different sizes of pumps are used at the originating station to make it possible to get flexibility needed for efficient use of

TABLE 1—MOTOR HORSEPOWER AND PUMP STAGES

Station—	Initial main-line units (hp.)	Pump stages	Initial tank-line boosters (hp.)	Pump stages	Future main-line units (hp.)	Future tank-line boosters (hp.)
Booth	1,750	Two	300	Single	1,750	300
	1,000	Single	300	Single	1,750	300
	600	Single	300	Single	1,750	....
Total	3,350		900		5,250	600
Mechanicsburg	1,500	Two	....	....	1,500	....
	1,500	Two	....	....	1,500	....
	800	Single	....	....	....	....
Total	3,800		....		3,000	....
Duncansville	1,250	Two	....	....	1,250	....
	1,250	Two	....	....	1,250	....
	800	Single	....	....	....	....
Total	3,300		....		2,500	....
Aliquippa	1,250	Three	250	Single	1,250	....
	....		250	Single	800	....
	....		....	....	400	....
Total	1,250		500		2,450	....
Grand total	11,700		1,400		13,200	600

TABLE 2—DESIGN PRESSURES AND FLOW RATES

Station—	Flow rate bbl./hr. range	Station suction presure psi. range	Outbound line pressure psi. range	Downstream pipe diameter (in.)
Booth	11,600	0-120	900	24
Mechanicsburg	7,600	0-300	1,000	20
Duncansville	7,500	0-750	1,200	18
Aliquippa:				
Incoming	6,000	0-200	1,200	14
Outbound	3,600	....	....	..



SUCTION LINES drain from tank sump 3 ft. deep. Sump is lined with ⅜-in. steel plate with two coats of coal-tar paint on outside.

power for handling various rates of throughput.

To give flexibility which will minimize waste of electric power, a new procedure has been devised. This is a special graphic method, designed by the company, to facilitate scheduling the operation of multiple pump units at the stations in combinations for varying the throughput in different sections of the system. By this method the units required for a wide range of throughputs can be easily determined. Within a few minutes, the dispatcher's office at Harrisburg can solve throughput problems of any combination of required pumpings and deliveries. Schedules will be adjusted to combinations of units to operate without, or with a minimum of, throttling.

Additional flexibility in control is also provided by in-the-line vertical single-stage booster pumps at Booth station for moving oil from tanks to main-line units. Aliquippa station has horizontal booster pumps.

Telemetering and Control

Continuous meter readings are indicated locally and on the control panel in the dispatcher's room.

Intelligence transmitted from pumping stations includes flow rates, suction, and outbound line pressures. Booth is the only station transmitting p.d.-meter readings. Data for these are recorded continuously and logged hourly.

In addition, complete control of all valves and operating functions for Duncansville station is handled at the dispatcher's board.

Duncansville station is equipped for full automatic nonattended remote control. Mechanicsburg station is designed so that it can be converted to full automatic control at minimum cost when this becomes desirable. Neither of these stations requires tankage.

Station protective functions are indicated continuously at Duncansville and on the board by lights. These include:

1. Low suction pressure.
2. Pump case pressure.
3. Incomplete sequence.
4. Position of transfer switches.
5. Station discharge pressure.
6. Outboard line pressure.
7. Excess throttling.
8. High flow.
9. Low flow.
10. Fire eye.
11. High strainer differential.
12. Supervisory channel test light and push button.

When there is trouble at Duncansville, the only intelligence transmitted to the dispatcher comes through illumination of either the mechanical or the electrical trouble light. These tell only whether a mechanic or an electrician should be sent to correct it. On his arrival at the station, he can find the nature of the trouble by the lights on the panel.

Status of each condition at the units is shown at the dispatcher's console by one of two lights—green indicating normal and red indicating trouble. This reduction of signals to the dispatcher to just two—one for mechanical and the other for electrical trouble—is a special Laurel feature.

If a bearing, for instance, is too hot, the unit is automatically shut down and locked out until repaired and reset by the mechanic. Meanwhile a red light shows this trouble on the panel.

All pressure measurements are transmitted to station consoles by SR-4 strain gages. Controls at the stations are operated pneumatically. At the terminal takeoffs, controls are electrohydraulic.

Notable items in automatic control equipment are vibration detectors for shutting down individual units and a detector of fire (known as the fire eye) which gives an alarm so that dispatchers on station operation can close the systems in.

Back-Pressure Control

Two types of back-pressure controls function in western Pennsylvania:

1. On Laurel Hill, when the pressure falls below 25 psi., a pressure transmitter signals for pinching the suction control valve at Aliquippa in order to bring the pressure up to the safe zone for preventing the breaking of the fluid column.

2. At the Duncansville station, a cell, having a calculated value for the pressure required for pumping over Cresson Mountain, governs the outbound control valve. By means of this extrapolation the liquid column is maintained, the same as it would be by a pressure instrument at the top of Cresson Mountain signaling to the Duncansville control valve.

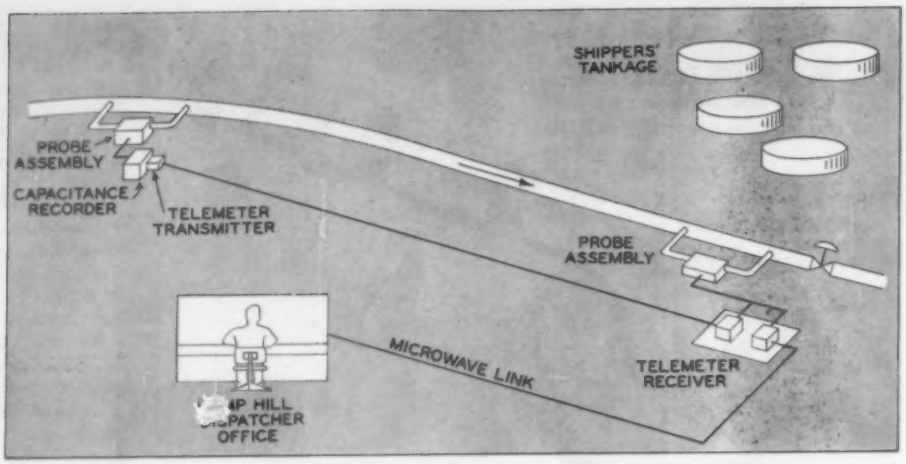
Product Deliveries

Operation of metering stations at takeoff points will be semiautomatic. Deliveries to terminals from the trunk line will be started manually. For it is advisable to have the delivery man purge the system of dissimilar products.

When purging is completed, the flow rate for the delivery can be set from the rate of flow by an electrohydraulic control valve. Operation of meter stations can be controlled locally or from the dispatcher's board where the rate of flow, positive-displacement-meter readings, and main-line pressures are duplicated. The dispatcher can open, close, or vary the delivery rate. Presence of a delivery man is not required for the whole delivery period.

The inlet valve at the meter stations can be set to automatically shut off after the scheduled delivery has been made.

El Dorado terminal equipment exemplifies installations at take-off points. These include capacitance in-



CAPACITANCE ANALYZERS give accurate information about the approach and arrival of batch interfaces at terminal delivery points.

terface detector, meters, strainers, prover tank, skimmer tank, sump tank, and regulator control valves for deliveries to shippers' terminals.

Capacitance Analyzers

Capacitance detection of batch interfaces is an outstanding feature of the Laurel system. A capacitance detector measures dielectric strength by a probe surrounded by fluid. The instruments being used on the line are more sensitive than earlier types. They are regarded as sufficiently accurate for pipeline purposes. Tests have demonstrated that they can detect differences in octanes of gasoline.

By adding relays and other electronic equipment in the future it would be possible to use capacitance interface detection for controlling valves. This step would bring complete unattended operation within sight for products pipelining.

Capacitance detectors on the Laurel system are intended to serve two different functions:

1. Detection of interfaces by a probe in fluid flowing through a bypass for the purpose of routine identification of batch movements.

2. Serving as a "magic eye" in defining movement of liquid in a "measured mile" during the calibrating of a meter.

The capacitance analyzer consists of a probe with a coaxial cable connected to a capacitance balancing unit. The probe is a capacitor with adjacent metal sections serving as electrodes. Dielectric difference is measured as fluid flows past the electrodes. Any change in dielectric constant detunes the oscillator circuit which in turn is rebalanced by the variable capacitor in a servo-type network.

Protection against errors is given by a feature which shows when the capacitance interface detector is not functioning properly.

Probe assembly, capacitance recorder, and telemeter transmitter are installed on a bypass for giving a minimum of 2 minutes' warning from a point upstream from the takeoff point. Intelligence is transmitted by microwave link to the Harrisburg dispatcher.

Magic-Eye Calibrating at Aliquippa Station

Capacitance-type meter provers use alcohol to define the column of products being measured by a "magic eye" in a "measured mile" or "miracle mile."

For determining the volume flow of liquid through a measured length of pipeline to verify the accuracy of a p.d. meter, an injection switch is closed, simultaneously energizing a time-delay relay; a solenoid valve starts injection of alcohol by pressure (exerted by nitrogen) into the pipeline. Length of time for the slug injection is preset by a time-delay relay. At expiration of the injection period, the clock timer is energized to record the transfer time from the injection point to the probe.

After the alcohol has been transported a fixed distance, it is detected by a probe connected to a capacitance analyzer. An alarm switch is immediately energized which stops the meter counter and also stops the clock timer.

The clock timer provides a comparison of meter accuracy under different flow rates.

By comparing true volume of the product in the pipeline section the operator can quickly compare this figure with that shown on the meter counter and thus prove the meter accuracy.

Products Batching

Deliveries to the last destination on the line will be of sufficient size to prohibit excessive contamination. The minimum delivery that can be taken off the line will be governed by the carrier's ability to deliver requested deliveries.

There are 17 nominated brands of products: three housebrand gasolines, three premium gasolines, four furnace oils, two diesel oils, one kerosine, handled in a common stream, two aviation gasolines, and two special premium gasolines.

There will be kerosine buffers between all batches except gasoline.

Proportional sample of each batch is taken by an automatic sampling device.

Dispatching

A tape method will be used in dispaching similar to that used elsewhere, but Laurel will fold up the tape to make it easier to review what has been done.

Dispatchers will work on shifts which overlap by 2 hours so that incoming dispatchers can become familiar with the status of operations.

On the dispatcher's board there are no red and green lights for anything indicating oil movement. A closed valve is shown by blue light and an open valve by amber.

Pulse code-work tank gages transmit measurements only to the mainline stations. But they could be transmitted to the Harrisburg dispatcher in the future.

Communication

Laurel will use a microwave system between Booth and Aliquippa which will be connected to leased facilities to Ohio and lateral points.

On the microwave communication system, one supervisory channel serves the manned stations.

Mechanical and electrical intelligence, each, has a separate point on the microwave system so as to isolate them from the normal voice channel.

Tanks

Booth station has approximately 2,000,000-bbl. capacity in receiving storage; Aliquippa station has nearly 1,000,000-bbl. capacity for breakout storage. At Ellsworth, Ohio, there will also be six 80,000-bbl. tanks for working storage.

Aliquippa with its storage is a smaller version of Booth station. It accumulates products for delivery to the Youngstown and Cleveland areas. It would be difficult to operate here without tankage because of the intermittent rate of receipts and the reduced rate of outgoing throughput.

In the original planning of the system, efforts were made to avoid the use of storage at the Aliquippa station. But it became necessary to have 13 breakout tanks to give the flexibility needed.

Aliquippa storage has 990,000 bbl. capacity; 90,000 bbl. will be assigned as common tankage for kerosine. The other tanks have been assigned for holding products of different shippers, destined for downstream delivery points. There are 13 tanks for this storage, 7 with floating roofs for gasoline, and 6 with cone roofs for distillates.

All tanks are 48 ft. high. In general their elevation is 45 ft. or more above the station. All tank lines are of 16-in. diameter at Aliquippa. Booth suction is 24-in. and Ellsworth, 14-in. The same lines are used for filling and emptying the tanks.

Tank bottoms will rest on a 2-in.-thick mat of cutback asphalt covering a foundation of a crushed limestone fill (diameter ½ in. to 3 in.) with sufficient small-size aggregate to fill all the voids and insure a firm and solid mass when properly compacted.

"All four initial stations are of outdoor type with only a canopy over the pumping units. Controls are housed in small pressurized buildings."

Suction lines drain from a sump (in each tank) which is 3 ft. deep and 8 ft. in diameter. Intake of the suction line is flared to an opening 5 ft. 2 in. in diameter; this is 18 in. above the bottom of the sump. A 4-in. water-bleedoff line running parallel with the bottom of the tank extends down to a drainoff point 2 in. from the bottom of the sump.

The sump is lined with ⅜-in. steel plate with two coats of coal-tar paint on the outside.

In cone-roof tanks the sump is 7 ft. off center in the direction of the drain line.

Pipe

With the exception of 20.7 miles of electric-weld pipe, all of the pipe for the system is seamless.

All laterals are built of .281-in.-wall, 12¾-in. pipe, with the exception of 2 miles of .250-in.-wall, 10¾-in. diameter.

Overland pipe is X52. Pipe was mill tested up to 85% of minimum yield. Pumping pressure will not exceed 72% of yield, less wall-tolerance allowance.

Pipe data for X52 pipe laid in the main line is shown in Table 3.

TABLE 3—PIPE SCHEDULE FOR MAIN LINE

	Wall thickness (in.)	Diameter (in.)	Length (miles)
Girard Point, Pa., and Eagle Point, N. J., to Booth station	0.312	24	25.6
Sinclair's Chelsea pump station to Booth	0.312	16	2.6
Booth to Mechanicsburg	0.375	24	18.5
	0.12	..	8.5
	0.281	..	80.0
Total			107.0
Mechanicsburg to Duncansville	0.312	20	13.0
	0.281	20	64.0
Total			77.0
Duncansville to Aliquippa	0.344	18	14.4
	0.312	18	29.0
	0.281	18	68.8
Total			112.2
Aliquippa to Cleveland	0.281	14	16.1
	0.250	14	89.0
Total			105.1

Construction

The route of the line traverses a wide variety of terrain including the swamps and tidal overflow land of the Delaware River area, metropolitan and suburban areas of Philadelphia and Pittsburgh, steep highsided mountains underlain by considerable rock between Harrisburg and Greensburg, as well as the rolling and plains country of eastern Ohio to Cleveland.

Delaware Crossing

The 24-in. line across the Delaware River near the Philadelphia International Airport was successfully pulled in a trench 65 ft. below mean low water. With protective coating and concrete jacketing, it weighed 690 lb. per lineal foot. During pulling it was buoyed. The trench was backfilled with 20 ft. of cover consisting of sand and gravel with a maximum clay content of 5% to protect the line from damage.

The Delaware River crossing was laid with X42 pipe of .375-in. wall, 24-in. diameter. This was coated with coal tar and jacketed with 2⅞ in. of concrete reinforced with wire net, with 10-lb. negative buoyancy.

The 17 miles of 24-in. west of Booth station in tidal flats is Somastic coated.

The rest of the line beyond the tidal flats all the way to Cleveland is protected with coal-tar enamel, glass mat, and asbestos felt.

Pipe Coating

All of the pipe was coated over the ditch except in a section in the hilly section in the area between Duncansville and Pittsburgh which was yard-coated with an additional wrap of kraft paper. Such yard coating there was by preference of the contractor.

The 17 miles of 18-in. main-line pipe through the residential area of Pittsburgh suburbs and approximately 3 miles of 16-in. and smaller pipe for the Aliquippa tank farm was mill coated.

Supervision and Personnel

The system will be manned by a staff of approximately 125 including office and field personnel.

Field operations for station operation and maintenance and line maintenance will be under the supervision of two district superintendents—one in charge of the eastern part of the line with an office at Mechanicsburg, and the other of the western part, officing at Coraopolis.

Administrative, engineering, accounting, and dispatching functions will be performed at a new building constructed for the company at Camp Hill, on the outskirts of Harrisburg.

WPRA REFINING QUIZ—1

Session on

Catalytic Reforming

Questions from the floor—
Answers from the panel—
with audience participation
in the discussion

THE PANEL

W. L. BANKS, Moderator
WPRA Technical Director
Tulsa

GEORGE JANDACEK
D-X Sunray Oil Co.
Tulsa

GEORGE F. KLINE
Blaw-Knox Co.
Pittsburgh

O. J. WEBB
Stratford Engineering Corp.
Kansas City, Mo.

W. L. HOUSTON
Phillips Petroleum Co.
Sweeny, Tex.

E. D. MATTIX
Cities Service Refining Corp.
Lake Charles, La.

WALTER COSINUKE
Catalytic Construction Co.
Philadelphia

E. H. McGREW
National Aluminate Corp.
Chicago

GORDON KERNS
Vickers Petroleum Co.
Potwin, Kans.

W. K. DANIEL
Standard Oil Co. (Ohio)
Cleveland

WILLIAM T. MADDOCK
Ohio Oil Co.
Findlay, Ohio

Here is a portion of the transcript for a 2-day session at the latest El Dorado, Ark., regional meeting of Western Petroleum Refiners Association. The remaining material will be published in future issues of the Journal.

BANKS: What is the effect of reforming severity on catalyst life for high-pressure operation or for low-pressure operation?

KILLEN (Standard Oil Co. of Ohio, Cleveland): I don't think anybody has very good information on that. We use a rule of thumb which is pretty rough that about an additional five clear octane numbers will halve the catalyst life.

BANKS: You feel there is need for additional information on this particular subject?

KILLEN: More here than in most places in reforming.

BANKS: What economics might you expect for a 300-psi. low-severity catalytic reforming at 60% design feed rate in a three-case regenerable reformer designed for high-severity 500-psi. operation unit?

DANIEL: We could say that the economics would certainly be favorable for the low-pressure operation. You might expect a 2 to 3% yield advantage for a given octane number and that is worth money. The low-pressure operation as specified would be a low-severity operation versus the high-pressure operation at a high severity. Of course, in lowering the severity you would lower your coke laydown. On the other hand, going to a low-pressure operation is going to increase coke laydown and the net effect on regeneration frequency, then, is going to be primarily the result of how much you are actually lowering your severity. However, according to the question, the low-pressure operation is only at a 60% design feed rate, so apparently you have time for additional regeneration. The over-all economics should, therefore, be in favor of the pressure reduction.

MADDOCK: The way the question is worded, it reads that you would be reducing the throughput to 60% of the design capacity. In order to get the low-pressure operation and looking at it from the investment cost, to reduce to a 60% level on throughput, certainly would make the economics quite questionable, even though there was an additional yield advantage. We've gone through some calculations like this in the past, though not exactly in the same way or using the same figures. We couldn't see the wisdom in cutting throughput to get the low-pressure yield advantage at this time.

BANKS: What is the industry experience in charging cracked stocks to catalytic reformers?

MADDOCK: We gave just a little bit of information last year on charging cracked stock. We had a coker-naphtha stream which was very high in nitrogen content. In order to reduce the nitrogen, which we were unable to do in a cobalt-molybdate pretreater, which was designed for about 400 psi. pressure and 22 volume hourly space velocity, we installed an acid-treating unit. This removed the nitrogen, which we thought was sufficient as far as contamination was concerned.

We then put it through the pretreater as a percentage blend of about 9% in the virgin feed. We obtained about one-third saturation of the olefin. We still had about 3.25-4.0% olefins in the reformer feed. We ran that way for approximately a month. Obviously we got saturation in the first reactor of the olefins which were not saturated in the pretreater, but the deactivation rate was approximately three times or so as high as during

a like period of time on virgin feed. So we took it out, and we have not attempted to place the coker material into a reformer since.

ROSE (Tidewater Oil Co., Delaware City, Del.): Our normal charge stock to our reformer would contain some coker naphtha; however, we have been unable to charge it due to plugging problems in our pretreat. The coker would be combined at about 20 vol. % with an intermediate naphtha and charged to a Unifiner and then to our Houdriformer. We are now considering treating of coker gasoline by two-stage Unifining.

Also, as a normal charging procedure, we take a heavy cat-cracked naphtha, Unifine it and charge it to our Udex feed prep unit where it is tailored for charging to our Udex; then a paraffinic portion of this cat cracked naphtha will be charged to the reformer. As far as we can determine (and it is a little early for us to have our numbers straightened out, because of our varying operating conditions) it is a fair scheme.

BARNETT (Standard Oil Co. of Ohio, Lima, O.): I think our experience on our Unifiner and reformer in our Lima refinery has been a little bit better than has been reported on so far. We're charging a mixed stock —about 7% coker cracked material with our virgin stock to the reformer —this is an 800-psig. pressure, 700° F. + temperature Unifiner. This stock has about 15 p.p.m. of basic nitrogen. We've been able to take that down below 1 p.p.m. and we don't feel we have any problems. We're charging this pretreated stock to our reformer. We might have some problems in mechanical fouling—with the pretreater charge exchangers, but as far as the reforming reaction itself is concerned it has gone along in fine shape.

JANDACEK: At West Tulsa we have a Unifiner that was designed to process a straightrun naphtha for Platformer feed. Since the unit has been on stream, about 10% of the Unifiner feed has been coker gasoline. The Unifiner has successfully removed all of the nitrogen, saturated all the olefins, and removed all of the sulfur. We have noticed no adverse effect on the reformer operation. We have not been on stream for a long time, however, and don't know how long this operation will continue.

KILLEN: What is the pressure of that Unifiner case?

MILLER: (D-X Sunray Oil Co., Tulsa): Our operating pressure is about 500 psi. and about 725° temperature.

ALEXANDER (International Refineries, Inc., Wrenshall, Minn.): Great Northern at St. Paul has a Unifiner reformer there that charges a stock of 40% coker naphtha. It is an integrated unit, so there is no rundown tankage to speak of. They do have fouling problems with the preheat exchangers, but they are consistently able to get nitrogen down to less than 1 p.p.m., sulfur down to 10 p.p.m., full saturation of all the olefins, and experience no particular problems in the reformer. Now that is a 900-lb. unit with about 650° to 725° F. bed temperature in the Unifining reactor. The question has been raised about space velocity—it was running about 1.3.

BANKS: What is the best way to determine the optimum time to change reforming catalysts?

HOUSTON: Obviously the optimum life of cat reforming catalyst is reached when the dollar value of the products lost due to the decline in yields is greater than the catalyst savings that would be realized by extending the catalyst life. To elaborate on that a little bit—the savings in the catalyst cost for an additional small increment of catalyst life, we consider as being the average catalyst cost up to that time. We can plot on a curve the catalyst cost at any given catalyst life. Let's assume that the cost of the catalyst, including labor, in a reactor is about $3.60 a pound. If you were to plot that on a curve you'd get, at 0 bbl. per lb., an infinite cents per barrel of catalyst cost; at 10 bbl. per lb. it would be 36 cents a barrel; at 20 bbl. per lb. it would be 18 cents, etc. You could then draw a curve. On this curve of catalyst cost versus catalyst life, the value of products lost in cents per barrl due to declining selectivity can also be plotted at given catalyst ages. Where the increasing curve of dollar value of products lost crosses the decreasing curve of catalyst cost is the optimum time to change catalyst in our opinion.

MADDOCK: I've got a question I would like to ask Bill Houston. What do you do when the severity shifts, and you get a different octane product? How do you compute the value of a higher octane reformate?

HOUSTON: We established for each unit a reference curve of yields versus octane numbers of reformate. This curve is established in a pilot plant using the feed stock for that particular unit. Two or three times per week unit samples are caught to establish the yield versus octane number for the unit. We then plot the deviations in reformate yields between the unit operating points and the pilot-plant standard curve at the given octane number. It is this deviation or decline in yield from the normal operating curve of the unit that is used to calculate the product loss in cents per barrel due to reformate being lost to light ends as catalyst selectivity declines. Since we are considering different octane-number reformates being downgraded into butanes, propane, and gas, we do correct for different octane-number reformates. The recovery or value of the light products is also calculated.

MADDOCK: Along this same line, I would like to cite the article, "When to Discard Reformer Catalysts," by R. V. Smith and Thorpe Dresser, of Sinclair Research Laboratories; that was published in the July 1957 issue of Petroleum Refiner. It deals directly with this problem, if it can be completely solved. It deals principally with relative activities and is an approach to try to get around different octane severities.

BANKS: How can the presence of catalyst poisons be detected on fixed bed catalytic reforming catalyst without shutting the unit down and purging for sampling?

KERNS: We are following our unit for BTX operations, rather than as a gasoline maker, and we survey the unit approximately every 2 to 3 weeks in a complete material-balance survey. In calculating the results of the survey we look at the naphthene disappearance and the naphthene efficiencies. We have a 55% paraffin feed, and at low severities, say 80 octane clear, we expect to get about 85% naphthene efficiency, and at 90 octane, around 105%. We use this efficiency as an over-all catalyst-efficiency number. If it falls off, we look for hydrocracking.

JANDACEK: We had a unit running in our Duncan refinery where there was no question about poisons —we were in arsenic trouble. However, sampling the feed stock is one way; and following Kerns' suggestion —yield evaluations on a consistent basis will give you a clue as to other poisons that may be present . . . watching changes in gas rates, temperature drops, etc.

KERNS: Of course, I was thinking of chloride being just as lethal a poison as arsenic although of a different kind. One of the problems refiners handling Kansas crudes have had has been the use of well-treating compounds which have chlorides in them. This is something that has become of particular interest in our area.

MADDOCK: We think that vertical bed thermocouples in downflow beds are very good indicators for early indications when fouling or contamination is occurring. This is specific, too, in the case of arsenic because you can see that the reaction is moving right on down in the bed, as you plot the profiles on a daily, or even a weekly, basis. And once you notice these trends, you can take measures to make corrective steps perhaps quicker than you can be seeing a yield shift. When it progresses to a shift in yield you're usually in pretty serious straits because the first bed has been, to a great degree, deactivated.

ROSE: I would just like to second that, Bill (Maddock), we use our data-logging system to good advantage in that regard. We punch out a temperature profile on demand, and we think it shows you faster than almost any other indication that you're getting poisoning. If you see you're flat in the top of your bed of your first reactor well you know something is getting in there.

KILLEN: It sounds as if two or three of these answers are for people without Unifiners or desulfurizers. To go back to what Bill Maddock was saying, even if you are not blessed with the thermocouples through the bed or have a radial flow reactor, I think that you can get a pretty good indication of poisoning. Our problem usually is not from the metals, so we haven't actually run into that, but regardless, first you'll see your octane fall off, or the yield fall off, and this may be caused by one of a variety of poisons.

An observation of what's happening on the unit will usually indicate what it is. If the main change seems to be in the ΔT across the first reactor, for instance, you would naturally suspect that you had some metal poisoning. But if, on the other hand, you noticed that your ΔT was improving, especially across your back reactors, you would suspect that you had nitrogen poisoning, which was decreasing the hydrocracking, and causing you not necessarily a yield loss, but the need for more temperature to maintain the octane.

These two poisons have an exactly opposite effect on what's happening in the unit, and it can be seen on an over-all ΔT even without the thermocouples. The other poison that is a problem to everybody is coke—if you want to consider that a poison—and it, of course, decreases the ΔT across the reactors as the coke level gets higher and higher.

HOUSTON: That pretty well confirms our experience in that we have radial-flow reactors, and we've had excellent luck in denoting metallic poisoning by drop in ΔT on the first reactor. When running for constant octane number, of course, as we alter temperatures to reach octane number, we get an increase in ΔT then in the second and third reactors. So we find early indication of the poisoning in radial-flow reactors by the temperature drop in the first reactor.

REIDEL (The Oil and Gas Journal, Tulsa): What successes have been experienced in determining arsenic content in crude oil—either direct determination in the crude, or in lab cuts of naphtha?

KERNS: We made a quick, unsuccessful pass at direct determination, and then gave that up as a bad job. We do make Oldershaw cuts of crudes and make arsenic and organic chloride analyses of the 150°-350° F. naphthas. This is our present method of appraising crudes for BTX. Out of this we get a BTX precursor analysis.

EPPARD (D-X Sunray Oil Co., Duncan, Okla.): The Duncan refinery did quite a bit of work investigating the arsenic content of naphtha in various crude oils. They were not able to develop a method of blocking out certain crudes or changing the cut points to reduce the arsenic content of the Platformer charge. Some of the crudes had very high arsenic contents, but we did not have facilities to segregate these crudes.

KOPF (Atlantic Refining Co., Philadelphia): Does anyone have a quick method of determining naphthene, that can be done by the operators of the unit?

BLACK (Houdry Process Corp., Philadelphia): The system we use is fairly simple. It involves a silica gel tube, which can be repacked. A special dye is added to the sample before it is poured in the tube. The tube is then placed in a box containing an ultraviolet light. This gives different colors to the various fractions, and then just by measuring the heights of the various fractions, the percentage of the paraffins, naphthenes, olefins, and aromatics can be calculated. It's fairly fast, but the sample has to diffuse down through the gel which takes an hour or two. This test is completely described as Method D1319 in ASTM Standards for Petroleum Products and Lubricants published by ASTM Committee D-2.

HATTMAN (Davison Chemical Co., Tulsa): There have been several published papers on this analytical procedure. The equipment has been modified considerably recently and, I would say, it checks the chemical PONA (paraffins, olefins, naphthenes, and aromatics) very well. The tubes used to be quite long; however, they have been shortened.

MADDOCK: In regard to naphthenes, we've had quite a time pinning down exactly which method is correct. We've worked it by the fluorescent indicator analysis and the mass spectrometer, and we certainly can't get good correlation between the two, as such. But along with this same problem which you have in relation to naphthene conversion, one instrument company, Foxboro, has recently come out with an instrument based on a dielectric principle, because the dielectric of naphthenes is quite a bit different from that of aromatics. It is called an octane-improver (see WPRA Tech. Paper 58-5). It doesn't give you octane directly, the exact octane, but it will give you a relative improvement which is a function of the conversion of the naphthylenes to aromatics. We have not had any experience with this, we have just received preliminary information on it.

KERNS: I'd like to add that we have recently had a comparison of component analyses with two other companies—one of whom used mass spectrometer techniques, and the other of whom used a method similar to ours, which involves getting P and N split by refractive intercept. We got excellent agreement with both companies on PONA's on the same materials.

ROSE: We can't seem to get good correlation between a mass spectrometer PONA and a fluorescent indicator analysis PONA. I have heard that somebody is using a chromatograph for a rapid, accurate PONA. Does anybody know of that?

KERNS: We tried it unsuccessfully in aromatic concentrates.

BANKS: Where are process-type

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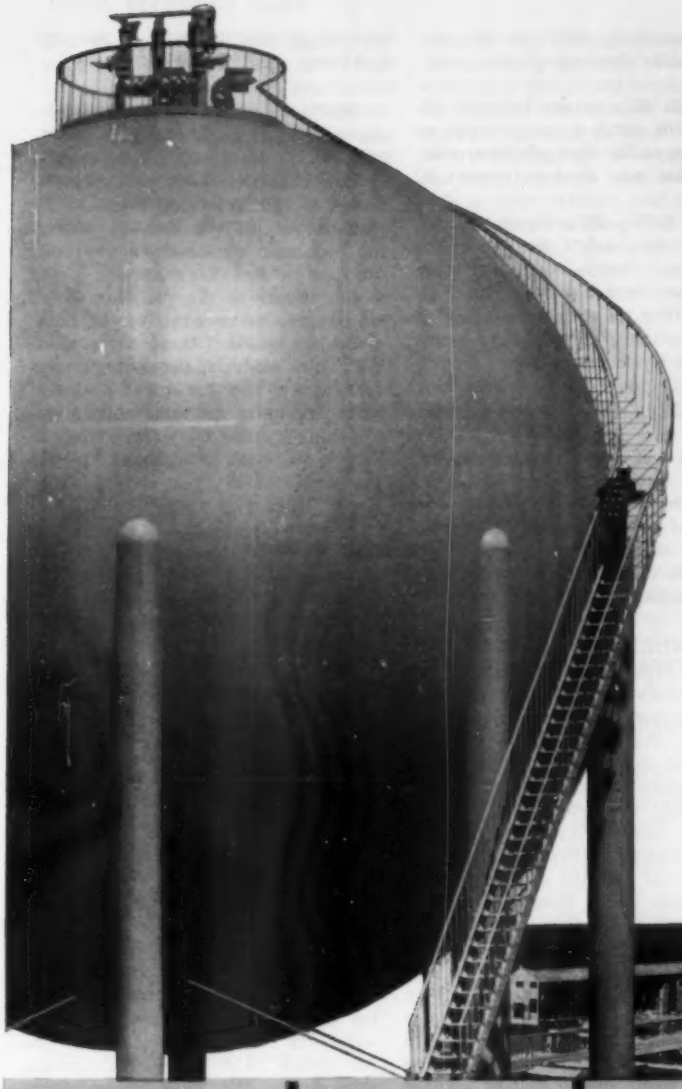

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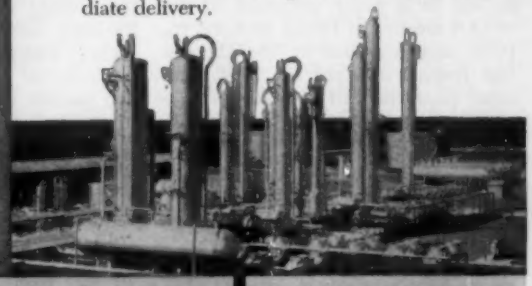

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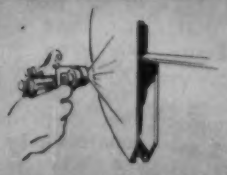

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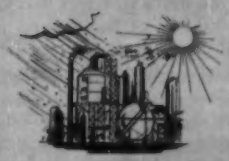

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chromatographs used in refinery process-unit operation and control? What is their effectiveness? Which specific applications have shown a good payout?

HOUSTON: Chromatography is a wonderful tool for use in making separations of hydrocarbon components. We have installed them in several services and have had excellent results. They are reliable, accurate, and provide a means for excellent automatic process control of fractionating columns.

In one instance we are using a chromatograph to automatically control a 13-ft.-diameter by 120-ft.-tall debutanizer column having 50 trays. It debutanizes a natural-gas-liquid mixture which has been depropanized. Loss of butane in the bottoms should be negligible and only a few tenths per cent isopentane in the overhead product. This is accomplished by controlling the isopentane concentration on the ninth tray from the top. The bar-graph analysis of the chromatograph is converted to a continuous output for a selected component through a system which we have developed. This system has been described in a paper presented at the NGAA meeting in Dallas on April 16, 1958, and published in The Oil and Gas Journal of April 21, 1958. Another paper on this subject was presented at the ISA annual symposium in Houston on May 12-14, 1958.

The continuous output from the analyzer resets the temperature-recorder controller (TRC) on the fourteenth tray which in turn resets the reboiler steam. The isopentane concentration on the ninth tray was maintained within ±0.2% of the desired 2.5% level. The chromatograph is a Perkin-Elmer model 184 with a 5-minute analysis cycle.

Also, we have installed chromatographs on the residue gas from cat cracker deethanizing absorbers to monitor propylene losses. Analyzers record the propylene loss in the ethane and lighter and operators can quickly adjust operating conditions to minimize these losses.

We have plans for installing additional chromatographs on other fractionating columns.

Obviously, we feel that each of these above applications has shown good payouts. These on-stream analyzers reduce to a minimum the loss of valuable products into less-valuable byproduct streams. They also minimize the amount of off-specification material product which requires either rerunning or blending off. There is an extremely bright future for process control by chromatography.

BANKS: Has anyone had any difficulty with catalyst compression or settling, in radial flow platform reactors? What was done to correct it?

KILLEN: No difficulty that I know of, unless the catalyst gets out of the screen basket that is supposed to contain it, and then naturally you'll get some settling. I've not heard of a case of settling, although apparently somebody has had this problem.

BANKS: Is there any new information on this question since we discussed it last year? Specifically, do you have any relationships of fouling and reactor pressure drop rates with olefin and oxygen content of naphtha. Also are there any additional identifying tests which can be used to predict a fouling feed?

COSINUKE: The fouling feed that has been experienced is caused by the basic sulfurs reacting with the dissolved oxygen along with olefins and chlorides. A number of surveys which have been made indicated that there is a relationship between fouling and the content of olefins or oxygen in the feed. Some refiners have followed a curve where the pressure drop could be predicted with the amount of oxygen content in the system. The form of measuring the oxygen was always quite a variable. The type used in one case was with a Leco tester, and they seemed to think the results were good. Others have taken measurements with this test and have found more oxygen coming out of the deaerating stripper than coming in. (In another unit, there was absolutely no pressure drop through the exchanger train, but they noticed a terrific drop across the strainers in the reactor. They claim they were running the same stock by analyzing the oxygen and olefin content of the feed coming in. A few months later they noticed a terrific drop through the exchangers and also through the strainer, but they couldn't correlate it. I don't know of anyone else having experiences like this.

FERRELL (Atlantic Refining Co., Philadelphia): Is anyone using any inhibitor with any success to reduce the amount of fouling?

KILLEN: We have tried a number of additives without much success. We have had success with one, and we think we've had success with another, but it's too early yet to tell whether or not we have in the second case.

ROSE: Tidewater is one of the units that Cosinuke was talking about. We've had polymerization experience in our Unifiner which pretreats the charge for our reformer. We're aware that oxygen plays a definite part in the formation of these polymers. In our case we feel that butadiene is also a contributor to the problem. What we have found is a mixture of butadiene polymer and iron sulfide scale. We're now analyzing the charge stream for oxygen and for butadiene, and we're hoping to get some correlation. We think without the oxygen, the butadiene will behave—perhaps it won't. We're also making test runs using an Erdco coker with various feed stocks and various inhibitors. There are several on the market for which great claims are being made. It's a little early to tell, but some of them do seem to have some promise.

MADDOCK: We definitely feel that reducing the oxygen in the feed is one of the major items in reducing fouling. And whenever we have been able to do that, whether it's in reforming or polymerization, or whatever it is, we've had, I'd say, reasonably good success. Other people have done a good job of eliminating it, but still have some fouling. We were one of the ones which Walt Cosinuke spoke of which developed this Leco test on determination of oxygen. It is a modification of an apparatus used for determination of carbon on the cat cracking catalyst, and the technique on this was published in the November 1956 issue of Petroleum Processing. We have made pretty good checks of the oxygen content of the feed, and after certain changes were put into effect, we could see considerable improvement in the amount of fouling which we got. The last run on our reformer was considered a very successful one with very little fouling occurring in the critical feed exchangers. This has been a result primarily of getting oxygen down to a minimum. We've even checked around the feed pumps in the field, and in the unit, and put flushes of naphtha back through the seal, in order to minimize any oxygen pickup, and that has been to some advantage.

BANKS: What problems have other refiners had with scale and rust fouling of cat reformer compressor valves and pistons which caused excessive wear in cylinder liners and rods during initial operations? What methods have been used to clean the suction

lines to keep them from rusting and scaling when placed back in service? Does anyone have a strainer-basket design that will effectively retain this material without excessive pressure drop or restriction of air flow? What has been other refiners' experience with buildups of the ends of recycle gas compressor pistons reducing the end clearance to zero?

JANDACEK: With reference to the last part of the question, we had this experience in our Duncan reformer where chlorides built up to the point where the clearance was zero. We had an idle amine unit available with a water wash and glycol drying section; this unit was used to scrub the recycle gas and that, of course, cleared up the problem.

CHAMBERLAIN (Republic Oil Refining Co., Texas City, Tex.): I'd like to comment on two things there—so far as strainers are concerned, we sometime back installed some tees on our suction snubbers, and we have an insert strainer that we normally put in when we're running the engines in after a turnaround, bringing the unit up to pressure, or the temperature for charge. We leave these screens in, and they seem to pick up most anything that you might worry about. So far as rust goes we have found that the important thing to do, when you bring the unit down, is to clean it out. We have a steaming procedure that steams all our suction lines and stuff like that. When you start messing with snubbers, you're going to have to make a decision one way or the other: to keep everything out of them and keep them purged with nitrogen completely, or else to wash them out real well. We decide ahead of time which way we're going. We've had real good luck on the compression end by just following the advice to keep the equipment clean.

BRANNIN (Cities Service Oil Co., Ponca City, Okla.): We have a treating unit on our recycle gas that we haven't had any trouble with, any of this carry-over, either. We have had a lot of trouble with valves in the compressor going bad. Have others had this same difficulty and if so how have you corrected it?

KILLEN: We have had this trouble and we have apparently solved it by the use of a composition valve, rather than the metal valve we were previously using. We haven't broken a valve or valve seat since we went to the asbestos-bakelite valve.

FLOOR COMMENT: I would say I'm like the first gentleman on this question—I'd certainly like to know something that would work, too. Not so much on the valve, as on the valve springs. We had all kinds of trouble. We've tried just about everything that the manufacturers have suggested as well as other refiners, and to date, we haven't found a thing that has really stood up. We have actually had to shut down the unit at times, and also run for short times without recycle. I don't have a list of all the things we have tried, but I know we have tried Inconel, plain carbon steel, 18-8, and others. Has anybody found anything in the way of springs that would do the job?

COSINUKE: Companies that have had this trouble with this buildup on their valves should look at their pretreat stripping section and see how effective it is. Compressor troubles of this nature can be solved by having a good pretreat stripping section which will remove the water and some of the carryover of ammonia and sulfur.

KILLEN: It depends on how the recycle gas is handled. You'll still have the salt problem in the cylinders that supply the pretreater unless there is a water-wash system, and it doesn't have to be complicated. We water wash by injecting a little water—a half-gallon a minute, or so—into the preheater reactor effluent ahead of the condensers. This keeps that condenser and the whole system clean. The water is then withdrawn from the following receiver. This has had a very beneficial effect in keeping the compressor clean. On this valve-spring question, one thing there that we find helps is to try and get the compressor well washed out before it is ever opened to the atmosphere, thus removing the ammonium chloride which does cause stress cracking if it is exposed to the air.

BANKS: Who is using Polyflo 100 ahead of desulfurizers or cat reformers for exchanger fouling control and what is the effect on reactor pressure drop?

HOUSTON: We've heard a lot of good reports on the use of Polyflo 100 to combat this fouling in the effluent-feed heat exchangers, so we got into the swim and tried it on our HDS unit and we've used it for about 3 months. The results so far are pretty inconclusive. Following the initial startup of this unit, these feed heat exchangers fouled rather rapidly. These heat exchangers had a design heat-transfer coefficient of 95. And after 72 days this transfer coefficient gradually declined down to about 30. We shut the unit down and cleaned out the heat exchangers.

We then started the unit up and the cleaned exchangers had a coefficient of 80. Well, we nearly dropped out of sight because in 6 days this exchanger coefficient had dropped down to 33. We then started adding Polyflo in a dosage of 15 p.p.m. and reduced the dosage to 10 p.p.m. after 10 days. We held this heat-exchange coefficient in the range of around 40 p.p.m. for about the next 14 days. The transfer coefficient then declined gradually to about 26 over the next 25 days. That looked pretty good to us, looking at that particular run. Then we shut down and cleaned these exchangers and started up again with heat-transfer coefficient of about 55.

We didn't have too good a cleaning job, and we started the Polyflo right in with the startup of the unit after cleaning the exchangers. The dosage we used then was about 10 p.p.m., and in 11 days this transfer coefficient gradually declined to about 33. We cut the Polyflo out for 3 days and couldn't find any change at all in the heat-transfer coefficient.

As far as reactor pressure drop is concerned, we have a radial flow reactor, and the pressure drop is not as affected on those types of reactors as downflow reactors. The reactor pressure drop has consistently been 1 to 1½ lb. on our radial flow reactor. So we haven't given up on the Polyflo. We intend to investigate it a little further with some higher dosages after our next cleanout, possibly up around 20 p.p.m. for about 3 or 4 weeks, and then possibly drop back down. We think it has some possibilities, but our data so far are pretty inconclusive.

KERNS: With regard to cleanout, a good cleanout is almost critical in getting a good run. I wondered if you had been trying chemical cleaning on some of these, or if this was all mechanical cleaning?

HOUSTON: The first cleaning, when we got back up to the 80 coefficient, was a chemical cleaning job. We actually removed the exchangers and acidized them externally in a vat to clean both shell and tube sides, and reinstalled them. After the next run, they were chemically cleaned in place on the shell side and the tube side. I think the data pretty well indicated we didn't do as good a job as we thought we had.

FROST (Pure Oil Co., Nederland, Tex.): I would like to ask, do I un-

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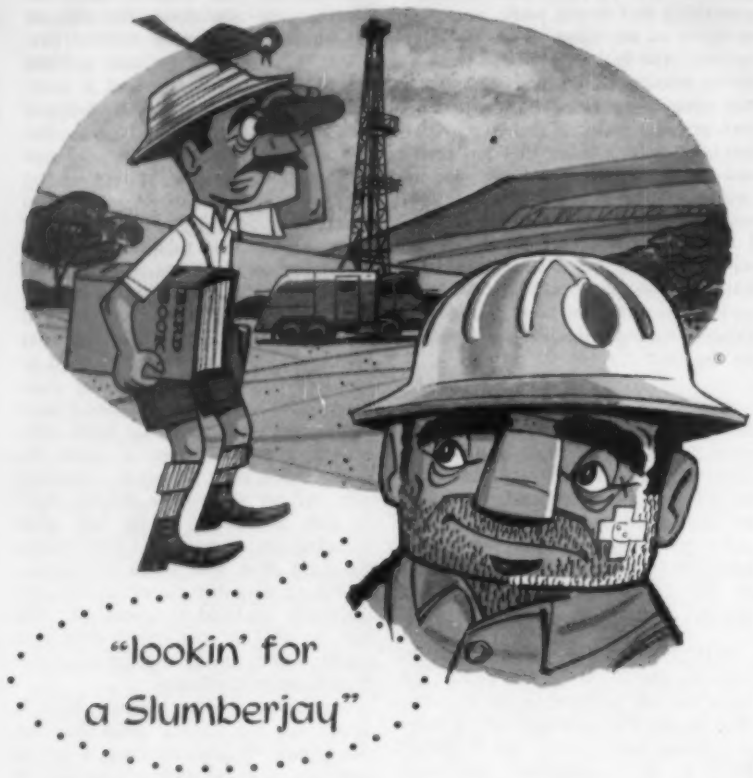

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derstand that these exchangers are for the desulfurizer guard case?

HOUSTON: That's correct; they exchange the feed to the furnace with the effluent from the reactor, and no hydrogen is added at this point. It is the straight naphtha feed.

FROST: That comes to the second question I had. Does Polyflo 100 have any poisoning effect, or other effect on your cobalt moly catalyst or desulfurizer?

HOUSTON: They tell us not, and we have no evidence of any poisoning at all of the catalyst itself.

FROST: The third question. At what point do you introduce your hydrogen? Is it at the outlet of your furnace?

HOUSTON: That's correct. Our hydrogen is preheated by heat exchange, and combines with the naphtha at the outlet of the heater.

FROST: In this preheat, what temperature are you maintaining? Is it above, say, the dry point of your charge stock?

HOUSTON: No. At the pressure and the boiling range of the feed stock we have no vaporization of the naphtha. At least it doesn't calculate to be vaporized at the outlet of the preheat exchangers. In other words, we're entering the furnace coil with 100% liquid feed.

FROST: I see. The reason I asked was that I had heard the comment just recently that when the ASTM dry point was exceeded in the exchanger, fouling was appreciably reduced.

KERNS: I'd like to comment on "passing the ASTM dry point." Our most severe fouling, in fact our only real fouling problem is at the point of dry-up. We have hydrogen in our preheat exchangers. We add about 300 std. cu. ft. per barrel of hydrogen in the feed to the desulfurizer guard case, and at the point of dry-up in our preheat exchange is the critical point. We have had trouble there twice in this past run.

ROSE: Don't you think the fact that hydrogen is with the charge, or not with the charge, at the point of fouling, is significant?

HOUSTON: In regard to that question, we had this problem on another reformer, and we tried intro-

ducing the hydrogen ahead of the feed heat exchangers. We found no appreciable effect on the rate of fouling on the exchangers by introducing hydrogen ahead of the preheat exchangers, or at the outlet of the coil. Regarding this question that Gordon Kerns brought up about the cleaning of the exchangers, there is some feeling that crud on these exchangers following a cleaning job tends to accelerate the crud that is laid down subsequently. We feel that we'd have better luck, and we hope to try it, with a real good cleaning job, and then trying the inhibitor. There is some thinking that polymer on the tubes does tend to accelerate the deposits.

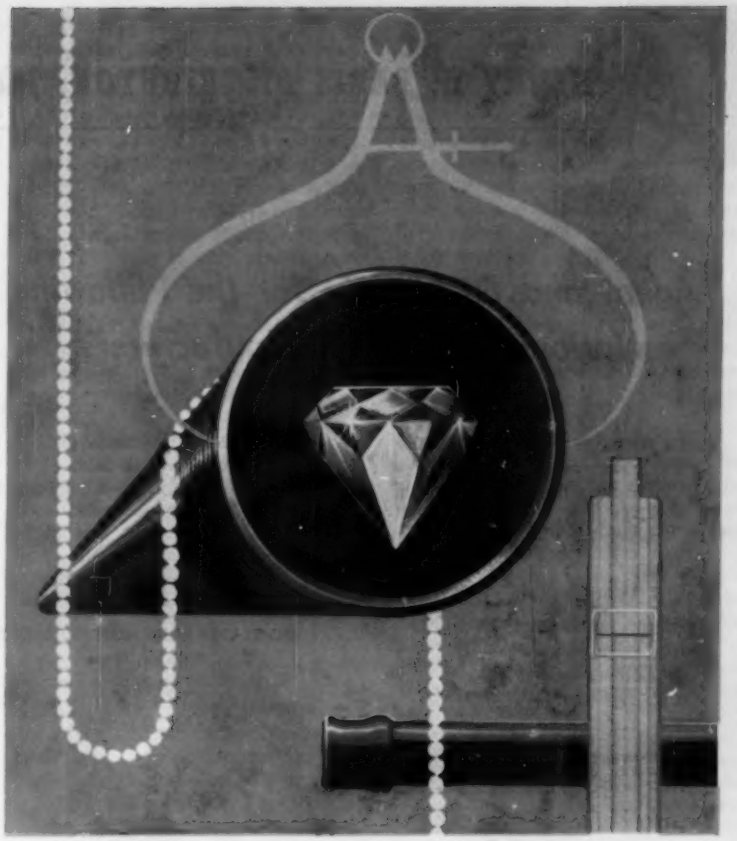
DUSSELL (Pure Oil Co., Nederland, Tex.): I have one other question, to Houston, on talking about cleaning the feed effluent exchangers, you said a good cleaning—what do you have in mind? We really get a fouled up bank of exchangers, and we're interested in the cleaning angle.

HOUSTON: Our experience has been that acidizing in a vat does a reasonably good job, using 10% inhibited HCl. It does a good job on the removal of sulfide scale, but we sometimes follow this with mechanical cleaning of the shell or charge side. As to what constitutes a good cleaning job, we'd like to see them back with the design heat-exchange coefficient after cleaning. That's something we strive to obtain but we don't always get there, due to cleaning procedures and press of time in order to get the unit back on.

DUSSELL: Along that same line, have you had any experience with cleaning the guard case heater? During our last shutdown we had an awful layer of scale and coke in the heater just ahead of the desulfurizer. And acid cleaning, to start with, didn't make much of a dent. We finally had to thermally decoke and then acid-treat again.

HOUSTON: We haven't had that heater on our particular unit down for burnout of the coil yet, so we have that bridge to cross. On one occasion we did acidize the coil. On catalytic reforming feed heaters and reheaters we use acid treatment of 10% HCl to remove the sulfide scale, but we haven't yet hit this problem of decoking our HDS feed heater yet.

DUSSELL: For those of you that don't know what the inside of your desulfurizer preheaters look like—we assumed that we didn't have a coke and scaling problem, either, until we



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cut a hole in the tube. We were quite surprised, and dismayed, I might add, when we found that we had a real coke-and-scale problem.

MADDOCK: In relation to the cleaning of the fired feed preheater on the pretreating section of the reformer, we have come to the conclusion that we should steam-air decoke, and then follow with the HCl cleaning job, as a routine. We have followed that plan several times, and have been very satisfied with the degree of cleanliness that the tubes have, following that type of treatment.

DUSSELL: Our experience on that was real good, too. Once we had a tough time cleaning it, but when we were done, with exactly that method, it was a very clean job; flushing was the hard part of it, actually, getting the scale out.

FLOOR COMMENT: I have a couple of comments on both the exchangers and the heaters. First on the exchangers, we have a hydroblast machine, which is essentially a wet-sandblast unit, and we've found that this gives us a cleaner exchanger than acid cleaning, and of course, our justification is it also gives us a much lower corrosion or metal-loss rate. We have gotten transfers as high as our initial design, or higher, after this hydroblast cleaning.

We put in two preheater furnaces because we were not getting enough heat on the preheat with one. Every time that we come down, we steam-air decoke our furnaces, and that is essentially all that we do, and we've had to clean them only once, that I know of, in the last 2 years to give us satisfactory operation. They do foul up and every time we come down we steam-air decoke.

FERRELL: Generally, we'll just echo some of the experience of others on this preheat furnace scale and corrosion—One approach to it would be perhaps to change the material used in the tubes of the furnace. We use 1.5% chrome-0.5% moly tubes, I was wondering how that compares with furnace tube used by others. Perhaps some of the people that are having this particular problem of scale and corrosion might be using a little higher-alloy tubes.

COSINUKE: This sulfide corrosion could be very easily cleared up based on one of the latest NACE (National Association of Corrosion Engineers) technical committee reports. They have made a very thorough study—they've compiled test in-

formation from about 30 refineries, of which Atlantic was one, and have come up with good conclusions. The type of materials used generally depends upon the hydrogen sulfide content in the process, which is the cause of scaling. From this report you can interpolate how much scale you are going to have in your buckets in so many years later. You take the hydrogen sulfide content, you go up on their chart and see what is your corrosion rate. You determine your surface, and you'll know how much scale you have. NACE also found that you don't gain too much going from carbon steel to the low molys (up to 9%), but you do get substantial increase in resistance to corrosion by going up to 18-8 range. So in the design of heater tubes, the low-moly-chrome are chosen because of a stress problem. This is pretty well adopted by the various design companies. Based on the hydrogen sulfide content if it is too much for the real low carbon moly, they go all the way up to 18-8 because there is little advantage in the 9% chrome range.

REIDEL: Has anybody had any experience with chemical cleaning of reformer heater coils of the pendant type?

MADDOCK: We have heaters made by Alcorn which do have the pendant-type tubes, and we have acidized them one time. Dowell came in and did this job for us, but we took quite elaborate precautions to make sure that we could combine the sections into a series flow. We took off the headers on the inlet and outlet, and then combined with temporary piping into series flow, such that we could get high velocities which they believed were quite necessary to get proper cleaning. It was also very necessary to get good neutralization at good velocities, followed by good water washing. We got very good results with this operation, and we've been very happy with it.

COSINUKE: In regard to preheat fouling, Socony made a survey with a number of other companies and have found that the greatest fouling occurs where the feed starts going into the vapor phase. An article was published recently in one of the magazines.

KILLEN: We have exchangers on two different units that illustrate both of these points—one with no vaporization, and one with complete vaporization as it passes through the train. We have bad fouling in both cases.

FROST: I would like to find out more about this pressure drop across your case. You were speaking about 1 to 2 psi. across this case, then what is the depth of the bed?

HOUSTON: This is a radial flow reactor with a bed depth something like 30 ft., with a radial flow through the outer screen and into a centerpiece. The flow is very similar to reformer-type reactors.

FROST: And do you have quite a buildup of scale in the top of this bed or not? If you do have scale, do you have any means of removing it?

HOUSTON: We've only started this unit up about May, and we haven't been into the case yet. I would expect that we would get some deposits of sulfides or scale down in the lower part of the annulus between the screen and reactor well very similar to what we have experienced on our reformer reactors.

DOYLE (Ingram Oil & Refining Co., Chalmette, La.): I want to mention one other fouling problem. We have a Platformer without feed treatment other than fractionation. We fouled the combined feed exchangers with corrosion inhibitors picked up in the prefractionator. The deposit occurs with vaporization and apparently has nothing to do with feed stock or oxygen.

BANKS: Is anyone else using corrosometers in water and process streams? What is their experience with the measuring equipment and the reliability of results?

HOUSTON: We have used corrosometers in process streams and have been well pleased with the results. In one instance, one was installed near the point where maximum metal loss was occurring in the bottom of a crude unit overhead reflux accumulator. The readings obtained by this probe over a 4-month period very closely parallels the actual calipered metal losses from the drum. During the 4-month period the corrosometer showed an average metal loss of 6.7 m.p.y. while the calipered metal losses over a 6-year period showed an average metal loss of 5.4 m.p.y. The maximum metal loss showed by the probe was 11.8 m.p.y., while the maximum calipered metal loss during 6 years of calipering the vessel was 11.7 m.p.y.

Another corrosometer probe was installed in the overhead vapor line of an NGL depropanizer prior to start-up. The probe showed a relatively high rate of corrosion (5.9 m.p.y.) when unit was placed in operation. During this period, the water from the overhead accumulator had pH lower than desired. We started adding ammonia to the overhead vapor line to control pH of the water and the corrosometer immediately showed a decline in corrosion rates determined from weighed test coupons in these same locations. We feel the corrosometer is accurate and reliable.

KLINE: The only instance of hydrogen corrosion of carbon steel reformer reactors that has come to our attention has been where a hot spot developed due to a failure of the internal insulation.

BANKS: Has any Ultraformer catalyst yet worn out, or shown signs of deactivation? If so, what age did this take place, and after how many regenerations?

ARNOLD (Standard Oil Co. of Indina, Chicago): Some Ultraforming catalyst has been replaced, that is, individual reactors have been replaced. The total number of regenerations that have been accumulated to date is in excess of 200. That catalyst is still going. I don't know exactly how many regenerations were accumulated on catalyst that was replaced, but it was in the order of 150 to 200. It is difficult to say that it was worn out. I think these things are never completely worn out, never completely inactive. That's been roughly the experience on Ultraforming catalyst; very little has been replaced, but there have been instances of it.

SKARKE (American Oil Co., Texas City, Tex.): With respect to the discarding of catalyst, we plan to discard ours at 270 regenerations.

FROST: What octane severity are you talking about at 270 regenerations?

SKARKE: In excess of 100 clear on total reformate.

BANKS: The use of blue temperature-indicating paint on reforming reactors, has in several instances shown up reactor hot spots. Since the temperatures are above the estimated safe limits of 560° F. these are cause of much concern. It has been suggested, however, that many refiners may have been operating safely for years in blissful ignorance, because they were not using the temperature-indicating paint. Does anybody have any data to confirm or deny this theory? Has action been taken by anyone who has this hot spot problem? And was it

successful? Are there any theories as to why one insulation job is successful and one is not?

COSINUKE: There is no question that there are units operating above the safe limits. But I think that if the results obtained in studies by Nelson, of Shell, and others were applied, someone would start worrying. You not only get blistering attack, but also embrittlement of steel. There is no question that you can operate for a short length of time under these conditions. The question is how long. We've known some of the reactors go up above a 1,000° F. on carbon steel, but these have been definitely limited in time.

I know of two methods that are now used to eliminate these hot-spot problems. One is water jacketing the carbon-steel reactors. The other method used was an 18-8 lining in the reactors. The reactors are strip-lined with thin sheets of stainless steel. The top is seal welded and the bottom is allowed to float free. This has worked extremely well. As far as the insulation jobs are concerned, one being more successful than another, I think that is strictly due to method of application: how the hex steel is installed, type of refractory used, but most important the application of it and the drying-out process. Many problems have occurred because of poor drying-out procedures.

HOUSTON: We would expect, possibly, that this problem is aggravated by high pressure drop through the reactor; in other words, as the pressure drop through the reactor increases, the flow naturally will take the path of least resistance. Many times hot spots are associated with high pressure drops wherein the vapor travel may even be in the void space between the shell and the refractory, or possibly at a high enough pressure drop, vapor may even flow through the refractory itself. So, possibly one approach to this problem is to eliminate pressure drop through these reactors so that the path of least resistance would be down through the bed itself.

KERNS: We have had hot spots on a single reactor which is the high-pressure-drop reactor of the three in the train. We licked these with a direct water spray. We had temperatures in excess of 550° F. near the inlet nozzle on our spherical downflow reactor, and I understand they are now hand-cooled with use of a direct water spray on the shell.

FLOOR COMMENT: We have reformers in all the Marcus Hook, East Chicago, and Wood River refineries. On the reactors in Marcus Hook, the initial hot spots develop on the inlet nozzles. Apparently the insulation in the nozzle neck itself had packed down, allowing the skin temperature to rise in the order of 500° F. or so. In that particular installation they merely built the dam around the inlet nozzle, filled it up with water, and continued overflow. I think that reactor was in service a little over a year before it was taken down. No indication of any cracking in the metal —the material was X-rayed and found no failures of any kind.

Corpus Christi refinery found the same thing to be true after a startup last March. Usually the hot spots would develop in or around a nozzle —where insulating would be a problem. At the Houston refinery, the guard chamber, in a series of four reactors, developed a hot bottom on a reactor. We decided this was due to channeling vapor through the insulation, or around behind the insulation. Due to the high pressure drop in this reactor bed, it was opened. We found that the bed was considerably fouled. A metal floor was installed by a tack weld to the seam. This made impossible any further bypassing. Since then we have had no high temperatures on any skins on any reactors.

KILLEN: In addition, I would like to say that internal shroud is not necessarily an answer. We have internal shrouds in all our Toledo reactors, and still have the problem. We also have shroud in our other reactors, and one of our other units has a hot spot in it too, in spite of the interal shroud.

GEORGIAN (American Oil Co., Texas City, Tex.): We had a small amount of trouble with hot spots which was satisfactorily controlled by merely removing the outer insulation and depending on air-cooling. Dick Skarke probably has some real details on that, and can give you the information.

SKARKE: Our reactors were externally insulated, and we removed the insulation in the area of the hot spots to get air ventilation, and have controlled them successfully in that manner. I have a question with respect to the hand-cooled shells: Do you expect any corrosion behind the internal liner, in that case?

ALEXANDER (International Refineries, Inc., Wrenshall, Minn.): At International we started up our reformer this past May, and we dried the refractory out. We have this blue indicating paint, which is very handy, you don't have to look around for hot spots, they jump out at you if you've got them. We dried the refractory out, dried the catalyst, and within 8 hours from the time we put oil in, the reactor heads were all over 600° F. We are now installing stainless-steel shrouds, and I pray that solves the problem, because we can't use water in time unless you want 6 ft. of ice around. Esso at Baltimore went along in blissful ignorance with its reactors, and then had to replace them in their entirety from hydrogen embrittlement.

BANKS: At what reforming severity level is it economical to drop below 3 cc's. TEL in gasoline?

JANDACEK: Generally speaking, most of us have had the idea that in order to maximize refinery realization we should operate at maximum lead levels and minimum reformer severity. We have experimented with a linear program and we're not at all so sure that this generalization is valid. We've run several runs on specific refinery operations where the program blends up the gasoline and does not use 3 cc. of lead, but uses fairly severe reforming. That is, fairly severe as we're used to looking at it in the Mid-Continent area.

BRANNIN: We have done quite a bit of work on this problem. We have a UOP Rexformer. We also have an IBM computer, and we've run quite a few economic studies. In every case it has turned out that we make the most money when we run the octane level on our Rexformer at the minimum that can be used for blending premium gasoline, and then adjust the feed quantity as to what is necessary to keep in octane balance in the plant. That usually runs to about 92 to 93 octanes clear; around 99 to 100 leaded. In our over-all studies in the plant we have found that as far as blending our total gasoline goes, we are better off profitwise to run for maximum lead, but after we get above 2.5 cc. of lead you're not gaining much for that last 0.5. This other thing on the Rexformer has been checked out many times—always comes out about the same way. That doesn't prove that it would be that way for everyone, because I think we each have specific economic problems.

ALEXANDER: I might say that we run our reformer on an intermittent operation because we have a jet-fuel contract, but we use reformate only

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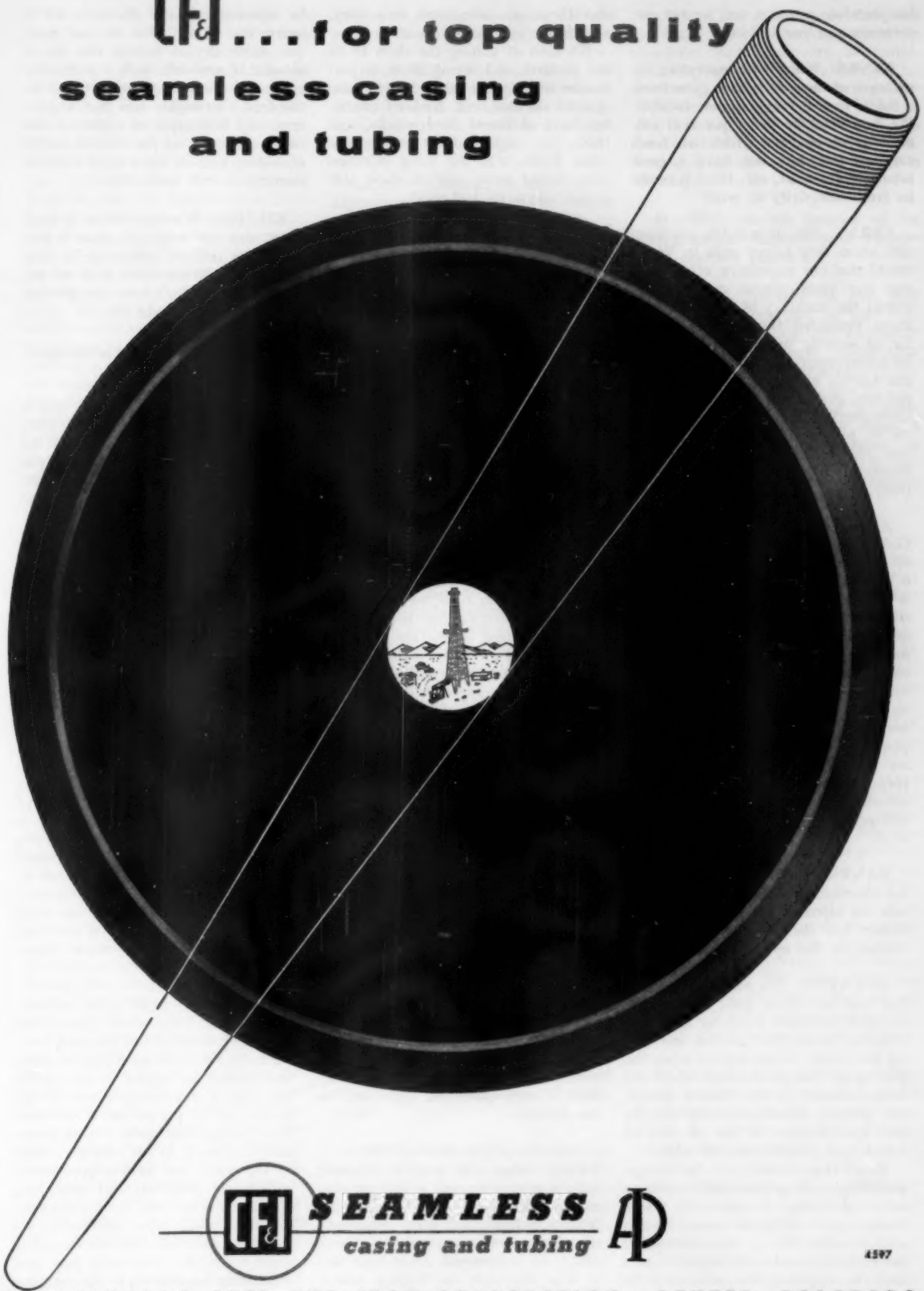

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BANKS: What is the operating experience of those who have gone from a 0.6% to a 0.3% platinum catalyst. We hear that the lower per cent catalyst gives as good yields on fresh catalyst, but does not have a good tolerance for coke, etc. Does it retain its fresh selectivity as well?

KERNS: We have 0.3% platinum and we're very happy with it. We've found that our naphthene efficiencies and our yield octane curves agree within the accuracy of our data with those predicted for 0.6%. And as far as activity in place as indicated by Ultraformer performance numbers, our UPN's have only increased with the run. Right now we are at a very satisfactory activity position, at about 50 lb. per barrel catalyst life. After two regenerations, we have shown significant increase over the fresh activity.

ARNOLD: The experience that Gordon Kerns just cited is typical of our company's experience with our 0.3% platinum catalyst. We've had it in use now for about a year and a half and while it is difficult to pin down to the gnat's eye yields on commercial units, we don't see a significant difference between the 0.6% and the 0.3% platinum catalyst in commercial units. Also, activitywise, they are similar. We are going to 3/10% platinum for our new units, and when we get around to replacing Ultraforming catalysts in older units which we undoubtedly will do some day, we will probably use 0.3% platinum catalyst.

BANKS: Some refiners report better reformate yields if water and chloride are injected into a reformer feed. Others find the opposite. What is the reason for this apparent anomaly?

HOUSTON: We would, of course, feel that the effect, good or bad, that water or chloride injection in a specific unit would have on that unit, and on the yields, would depend upon the particular charge for that unit; the water content in the reactor charge, the natural chlorides in the charge, and the nitrogen in the charge, all which tend to alter your chlorides.

Other characteristics of the charge, probably such as naphthene content, would also affect the selectivity which would require different rates of water and chloride. We, on our units, have used chloride and water injection as a tool to improve the selectivity or yields. There are no standard rules, and these injection rates may vary, and do vary from unit to unit.

It's kind of cutting the cloth to fit the pattern, and trying it on a particular unit to see what benefits are derived on that unit. And, of course, we have different feed stocks, and these, too, require different injection rates. Units with the same injection rates would show, and do show, different selectivity and yield.

BRANNIN: We've had a little problem along this line, too, and I think I have something that might be of general interest. We have a UOP unit. We have noticed on our startups that we get quite a bit of chloride in our burners on our furnaces. We burn the excess recycle gas. We believe that the water in the recycle gas is leaching the chlorides from the catalyst. The type catalyst we are using is supposed to have around 0.3 to 0.35% chloride.

On two shutdowns we found that the catalyst has been down to about 0.1%. I am quoting some of the people's feelings at UOP on this, as far as recommendations go for improvements. They feel with the type of feed we have, which is a fairly highly paraffinic type, we are losing on product distribution because the chloride content is too low. We are now planning to change our gas-treating unit so that the glycol, the drying agent, will be regenerated under a vacuum so that we can carry a lower water content in the recycle gas. With drier recycle gas and hence chloride content in the catalyst, we hope to pick up as much as 0.5%, or maybe a little bit more, in liquid recovery.

We have also noticed, when we have to shut down the recycle gas-treater dehydration section 8 hours to work on a pump, that we get quite a bounce in octane; that is, a one or two clear octane reduction and it usually takes 3 or 4 days for the unit to recover. Apparently the chlorides in the catalyst are important, especially so with a paraffinic-type feed. Our regular feed to the unit contains about 40 to 45% naphthenes. With a Rexformer you have an extraction section, and the recycle is essentially paraffinic-type material so you end up with a very paraffinic-type feed to the reactors.

ADAMS (D-X Sunray Oil Co., Tulsa): When you have a reformer with a pretreater and a stripper that essentially removes all the chlorides from the feed, and takes essentially all of the water out of the charge stock, we understood at one time that it was desirable to replace about, say, 20 p.p.m. of water in the feed for optimum activity. Recently we've heard that it is better to run your unit bone dry if you're able to. I wonder if anybody with a pretreater and a good stripping tower that dries the feed thoroughly has had experience with both types of operation and could comment on the relative merits of adding a small amount of water or running a unit bone dry.

KILLEN: We have done it both ways, and our early indication is that there is a definite advantage in running it dry. Much more than we expected, but we don't have enough data to definitely conclude this.

ADAMS: What is the advantage—yield?

KILLEN: Yield advantage, yes. It doesn't show up too much in what actually goes out the bottom of the depropanizer, or stabilizer, but if you correct to a 10-lb. vapor-pressure basis, for instance, you do see an advantage.

ADAMS: Do you find that you have to run at a higher severity level on temperature to maintain octane?

KILLEN: Absolutely. It's marked—probably a 15° difference, for taking out 20 p.p.m. of water.

ADAMS: When you speak of bone dry—how dry is this?

KILLEN: With the stripper conditions that we have, it should have zero water in it. We measure 10 to 15 p.p.m. of water, but theoretically it isn't there, and whether the theory is right, or the analysis is right, I don't know. It's about a 460° to 470° F. reboiler temperature on the bottom of the stripper tower, and the stuff should be dry. We use a modified Karl Fischer test for water determinations.

MADDOCK: Most of the information that we have would pretty well second what Killen has just said here. We have, I'd say, a good feed-preparation section in regard to drying the feed, but in our analysis we run 20, maybe to 25 p.p.m. on a modified Karl Fischer, but again it is an essentially dry feed. In the course of runs in the past, we have experimented with water addition, and depending on the chloride level on the catalyst, this does make some difference. We would get an initial kick out of adding some water, but eventually lose, and we'd have to rebuild to the original condition again with the chlorides.

However, to cite the opposite, on one complete run that we made on a batch of catalyst, we used the approach of using almost no chlorides at all during this run, as compared to previous runs where we had added in the order of about 0.5-1.0 p.p.m. of chloride. In this run we added about 15 parts for a couple of days, just as we started the batch, and then we cut the chloride out completely and left it out during the entire run. It took an initial higher temperature of probably 15°-20° than what we would have expected on the other batches of catalyst for the same octane. We got what was a very, very stable operation, so that at the end of about 50 bbl. per pound of life, we used a lower temperature to make the same octane than we would have done had we added the small amount of chloride as the previous batches.

The effect was that it changed our distribution of yield to make a higher percentage of methane and ethane, although the hydrogen was about the same. But the 10-lb. yield of the product was substantially higher so that we felt we were justified in going to this type of operation.

BRANNIN: This might shed just a little bit of light. I spoke of the change in operation on our recycle gas treater a minute ago. We now have about 220 p.p.m. of water in our recycle gas; it's felt that the modifications are going to cut it down to 90 p.p.m. and it's hoped that that is going to give us at least a half per cent more liquid recovery.

HOUSTON: I think it's pretty easy to see that water and chloride injection is pretty controversial. We had one interesting experience on one of our units using a UOP R-5 catalyst. We had reached the catalyst life of about 100 bbl. per pound, and the decline in yield of the stabilized, of BF platformate, indicated that we should change the catalyst. So, in an experimental run, we started raising the water injection in the feed. We increased it up to as high as 100 p.p.m., and we were quite surprised to see this catalyst come to life again, and wind up with selectivity and yield approaching that of new catalyst. That catalyst has been continued in operation beyond the life of 200 bbl. per pound. So again it looks as though for any particular unit you have to just cut the cloth to fit the pattern. Again, it just adds another facet to this complicated problem.

BANKS: Has anyone an idea for continuous monitoring of HCl in cat reformer recycle hydrogen. Would such an instrument be of value?

HOUSTON: We don't have any such instrument, but we certainly think it would be of value. If anybody has one we would be interested in it.

KLINE: Although we have had no experience with it, a Davis Halide meter, using a copper electrode to produce a blue light which is detected by a filtered photo cell, might be used in this application.

BANKS: What success has been experienced with moisture analyzers on recycle gas? Are maintenance and calibration time consuming?

HOUSTON: We've had fairly good success with the phosphorous pentoxide analyzer such as the Consolidated moisture monitor. The manufacturer supplies us calibration curves for use of these sampling cells in hydrogen service, so that eliminates the calibration of the cell in plant. Using the manufacturer's calibration curves on these instruments on the recycle gas we find them to be quite accurate as checked by laboratory analysis using the Karl Fischer reagent test.

One thing we have had trouble with, in the early use of these instruments, was in the filtration of the sample. They're making improvements to that and Consolidated now has a new porous teflon filter which goes into the sample stream and filters out any fine particles. If these particles enter the cell they will short out the cell. We've had real good luck with this new filter.

I had one other thing—somebody asked about the maintenance—how much maintenance is involved? Once we licked this filtering problem we checked this apparatus about once a week. It requires about 10 minutes of an instrument man's time to make sure that we have a constant flow through the cell.

BANKS: Since nitrogen depresses hydrocracking more than any other reactions, why would a certain amount of nitrogen not increase reformate yields?

KERNS: I think a lot of us would theorize that at the same time you would repress the acid catalyzed cyclization reaction to the naphthene intermediates, lose out on your paraffin contribution to aromatics make, and therefore lose octanes.

NORRIS (Houdry Process Corp., Philadelphia): I have one comment on that—you can show an increase in apparent liquid recovery as hydrocracking builds up, even though this occurs from chloride poisoning. The chlorides increase, cracking increases and more C_6, C_7 hydrocarbons are produced. There is an apparent increase in yield, which, of course, is fleeting.

DANIEL: Is this because of the change of the composition of the paraffin fraction primarily?

NORRIS: Actually, if you had only the platinum part of your catalyst working, you'd get a volume shrinkage, because your octane then would be due to aromatics.

BANKS: What sort of a yield-octane relationship is being obtained from reforming natural gasoline, or light naphtha, 170° to 250° F. approximately? What operating pressures are being used?

HOUSTON: At our refinery at Sweeny we have two reforming units. One of them we call a low-end-point reformer; prefractionator is a mixture of about 50% depentanized natural gasoline and 50% depentanized low-end-point straightrun from crude. This prefractionator at the present time partially dehexanizes the feed to the unit. The characteristics of the reactor charge looks something like this: It has a 64° API gravity, an initial of 160° F., 50% point of 186° F., 90% of 225° F., and an end point of 295° F. The research octane with 3 cc. runs between 80 and 83, naphthene content about 37%. We are presently holding the product separate on this unit at 300 lb. The inlet to the first reactor runs around 420 lb. The outlet from the third reactor is about 360 lb. And some of the points spotted off of a typical yield curve for this operation would look something like this: BF yield, 96% research octane number with 3 cc. of 89; at 92% yield, octane number 92; at 88% yield, octane number of 94.8.

BANKS: In units having catalytic desulfurization, what methods are used to minimize, or prevent pressure drop across the reactor, and how successful are these methods?

HOUSTON: We were confronted with this problem on a downflow desulfurization reactor. The pressure drop through the reactor was excessive from the startup of the unit. We made a pressure-drop survey and we found that we had a pressure drop

of about 60 lb. through the top few inches of the catalyst in the bed. This pressure drop, we later found out and theorized at the time, was due to iron sulfide scale depositing in the top of the bed.

Following this trouble, at a subsequent shutdown we installed buckets in the top of this reactor bed. These buckets are installed on the basis that the vapors flow down through these buckets and are bypassed around the crust that forms on the top of these reactor beds. Following the installation of these distributor buckets, the 60-lb. pressure drop which we had found in this pressure survey was reduced to where it was negligible; in other words, not more than 1 lb.

Following this experience, we installed these buckets in other downflow reactors. A typical basket might be 6 in. in diameter, maybe 18 in. to 2 ft. long, with a bottom end closed. It would be fabricated from screen, and the baskets can be hung from the top shell of the reactor. A portion of this basket extends above the bed, say half of it, and half of it extends down through the bed to allow the vapors to get down through the crust.

We also noted on this particular unit that the survey indicated that we had a high-pressure drop something in the order of 50 lb. on the outlet piping or the collector arrangement down in the bottom of the reactor, and that was modified. Since that time we've had real good luck on pressure drops through these reactors, and they've been down in the order of a very few pounds.

FROST: The screen that you mentioned, what dimension was that? I'm thinking particularly of the sulfide particle size.

HOUSTON: I don't remember the exact dimensions. I think it is something around 9 to 12 mesh. The sulfide scale would fall into the bottom of this basket and not adhere to the vertical sides of the basket.

FROST: Have you examined any of this? Have you opened your bed and taken a look at it, as to the physical appearance of the screen?

HOUSTON: We have on some of the various reactors. I'm afraid that I don't have the details on the screen inspection. I think that as long as it is sufficient mesh to keep the catalyst out of the bucket, it would be pretty good design. Similar to the mesh, maybe, on your retaining screen.

FROST: You mention, too, that you have about half of this 18 to 24-in. basket length or bucket length, extending above the catalyst. Do you have a ball layer on top of the catalyst? What does the top of your bed look like?

HOUSTON: To my knowledge we don't have any ball layer on the top of the catalyst itself.

FROST: Do you have any catalyst movement in the top due to vapor velocity?

HOUSTON: Not on downflow reactors. We feel that we would experience that problem on radial flow so we do pack the top of those reactors down with fire brick laid on top of the screen. Some of these buckets have actually been made out of slotted pipe wrapped with screen, where both ends would be closed. In other words, the principle is to bypass the vapors around this crust on the top of the bed, and our experience has been real good.

KILLEN: On this matter of screen size, I think the same thing would go for these screens as for the retaining screens. There has recently been a manufacturer, Tyler, who has convinced UOP that they can make a screen which will have all the necessary strength. It will retain the catalyst and still have 50% more open area than we have conventionally been using in the reactors. I think it is well worth investigating for anybody who is interested.

KOPF: We have also used this screen approach. We have opened up the reactors several times since we've been putting these screens in. Our general experience has been one of increasing the number of screens every time we open up. We find the area inside these screens pretty well filled up. In other words, they definitely have improved our length of time that we can run without plugging, but we still get piles and piles of the scale. We really haven't solved the problem. We have continually added more buckets. You reach a limit on how many you can get in there.

HOUSTON: That's a good point. In an 8-ft. reactor, we would possibly install as many as 35 or 40 of these buckets.

KOPF: We have reactors smaller than that in some cases and we have 25 to 30 buckets in them.

KERN: These are all nonregenerable units we're talking about, aren't they?

KOPF: We're talking about a Unifiner reactor here. At least I am.

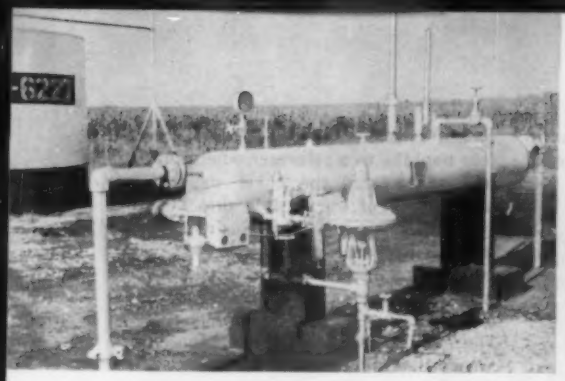
MADDOCK: I might add a little bit of our experience. Ours parallels to a great degree what Bill Houston has mentioned in regard primarily to the pretreaters. That's where we made our first application with very good success. Again, we found the same thing that Kopf, of Atlantic, mentioned. But the screens would have these very, very small particles of deposit adhering to the pieces of the wire, which tended to plug the basket.

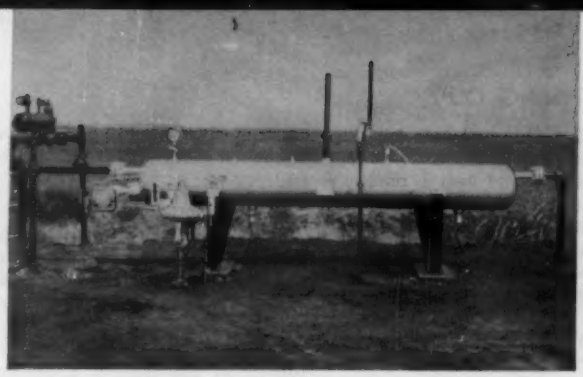
But we perhaps have a higher percentage than some of the other people have—we have approximately 50% of the area of our bed on the downflow reactors covered with these baskets of about 5.5 to 6 in. in diameter, and then we have enough area below that, so that it equals at least 50% also of the area of the bed, and we had enough success with them on our pretreater that we applied them on all of our downflow reactors, and if we didn't have them today, we would have had an extra shutdown. I can say that, on the present run, because we've gone to a smaller-diameter particle on the catalyst. That of course definitely makes a difference, and with these screens we catch enough of this scale and deposit in the bottom of it that it enables us to stay on stream.

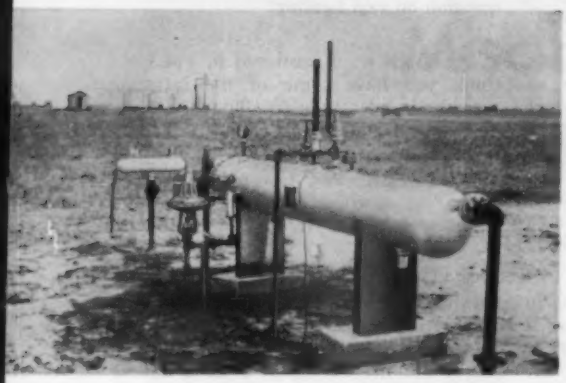
We do have alumina balls scattered around these screens, or baskets, where they protrude above the catalyst bed. Ours protrude about 5 in. above the catalyst and we have this filled with alumina balls of 1-in. diameter, and have even got some of the balls down in the baskets. In this case they are primarily to keep the catalyst from coming through because of the marginal size of the catalyst and the opening of the baskets.

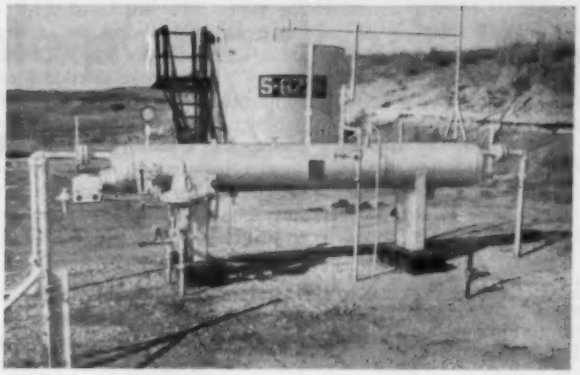
DUSSELL: What length of runs are you talking about, before and after?

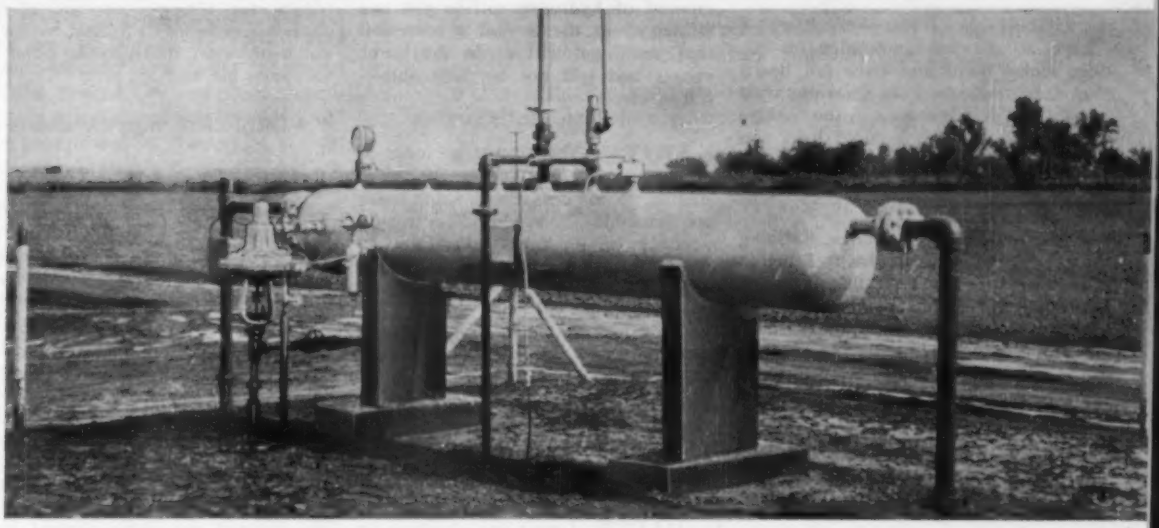
MADDOCK: Well, on the one cited, we changed from a 3/32-in. to a 1/16-in.-diameter catalyst. With 3/32-in.-diameter catalyst we had no trouble as we ran a year. The pressure drop increased almost nil, and there were two startups in that time. Pressure drop on the first reactor, which was the worst, was around 8 to 10 lb. On the present run, in going to a ⅛-in.-diameter catalyst, with the same throughput, we've got pressure drops in the order of 20 lb., as compared to the 8-10 lb. before. This is for a run of about 2½ months, so far.











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DUSSELL: Our normal desulfurizer reactor drop is about 15 to 20 lb., on a startup, and over 6 months' time we've come up with as much as 50 to 60 lb., and we've encountered that crustlike scale that you're talking about, but we haven't used the baskets, so we're glad to hear about your experience with the baskets. We've heard about them, but we haven't put them in effect yet.

MADDOCK: Well, I'd make sure you used stainless steel on that to minimize corrosion. That's one step that you can do to help yourself considerably so that any closure of the opening is done strictly by the deposits which are carried into the reactor, rather than corrosion of the wire itself that is used in the basket construction.

GEORGIAN: I'd like to ask, as a matter of curiosity, how many pounds of scale are we talking about, that we're catching in these buckets?

HOUSTON: I just don't know. I have no detailed knowledge of this particular point and have not heard any reports concerning the amount of scale that was removed in the baskets themselves. I wish I could help you on that, but I just don't have the information.

MATTIX (Cities Service Refining Corp., Lake Charles, La.): I had a question on furnace-scaling problem. Has anybody gone in and correlated heat-exchange rate on these furnace tubes where you are having trouble, and where you are not having trouble? We had one furnace on which we were up to about 15,000 B.t.u.'s per sq. ft. We were having excessive trouble on it, and we cut it back to 12,000 B.t.u.'s per sq. ft. This has reduced the trouble materially.

COSINUKE: I think the NACE report mentioned before will give you the effect of temperature and hydrogen sulfide content in respect to corrosion. Even distribution of flux on the tubes is the most important item in the design of a furnace. Depending on the design, some parts run hotter than others and the corrosion will definitely be more. If one designed a heater with a thousand radiant burners you would be able to insure an even flux distribution, but, with a few burners, your distribution will not be as good. The temperature effect, they find, has something to do with it, but not nearly as much as it was thought of before. I am sure that if you can get this NACE article, most of the corrosion problems that you have encountered with H_2S will be better understood.

KILLEN: Concerning this problem that Walter Cosinuke was talking about with corrosion and the materials of construction, I asked a question here last year which nobody answered. It was: "Would it help prevent the fouling of the preheat exchangers if the tubes were made of 18-8 steel? Since we couldn't get an answer, we tried it. Our answer now is "Save your money". I see some startled looks, so some others have had some different experience, but we have used the stainless on the Ultraformer and the Platformer with no reduction in fouling. Of course, the corrosion rate is much lower, but the difference is not enough to justify the more expensive material.

COSINUKE: Is the fouling due to a definite corrosion attack, or is it olefins or oxygen in your system? If you are using 18-8 and with the amount of hydrogen sulfide you are talking about, the amount of corrosion that you'll get will be in the lower ranges and will not be noticeable—it'll be clean.

KILLEN: The answer to most of your questions is "yes". We have olefins, in some cases, in some cases we have H_2S. We find corrosion products on the tubes in addition to the hydrocarbon. Since it didn't come from these exchangers, it obviously came in with the feed stock from tankage or from the preceeding unit. We had hoped, though, that the 18-8 surface, by not fouling or corroding any itself, would offer a clean surface and nothing for the incoming particles to cling to as easily as before. Well, our hopes weren't justified.

MATTIX: I have one comment on this heat-exchanger fouling. It's not on a platinum reforming unit; it happens to be on a hydroformer. We have charged the same feed, or essentially the same feed to the hydroformer that we have to the thermal reformer. On the thermal reformer we have excessive heat exchanger fouling. On the hydroformer we have none. We have an oxygen stripper on the hydroformer, and we believe that is the difference in the two cases.

WURZLER (Socony Mobil Oil Co., Inc., New York): There was a question: "What is the industry's experience in charging cracked stocks to catalytic reformers?" In the first suggestion that was made, someone discussed charging a high-nitrogen-content naphtha to a reformer where they had acid-treated the coker naphtha, and they went on to state that 10% of the olefins remained in this naphtha when it was charged through the pretreater as a blend, and that their pretreater catalyst had deactivated about three times the rate as when they charged a straightrun naphtha. I would like to know who answered the question on acid treating?

MADDOCK: I answered it, but I think you have some of the facts turned around a little bit, though. Do you want restated what I gave?

WURZLER: Yes, I would like to know the nitrogen content of this coker naphtha you were talking about.

MADDOCK: Well, our testing was on the coker naphtha—this was on a total nitrogen basis rather than a basic nitrogen basis. It was in the order of about 115 to 120 p.p.m. and we did reduce the nitrogen content of the coker naphtha itself, treated by itself, not with virgin, down to the order of two parts per million.

WURZLER: "With the acid treating step only?"

MADDOCK: That's right, it did a very effective job of removal. Then we took the treated coker naphtha, which amounted to 9% of the total blend, and blended it with the virgin naphtha. We put this over a pretreater which had been initially designed for platinum catalyst. The platinum had been replaced by cobalt molybdate catalyst. The space velocity was 22 VHSV, rather than a conventional 5 or less as some have, and with that very high space velocity we only got about one - third saturation of the olefins. We lowered the olefin content from around 5% down to about 3.5% of the total blend. The balance of the saturation was done in the first reactor of the reformer. We got a decrease in activity of roughly 2° F. per week, for the same octane as compared to about ⅔ of a degree Fahrenheit per week without the coker naphtha in there, under the same conditions.

This is Part 1 of the 1958 WPRA El Dorado, Ark., question-and-answer refinery meeting report. Part 2 will deal with Maintenance and will appear in the March 2 issue. Part 3, dealing with Coking will appear in the issue of March 9. Part 4 (Alkylation) will appear March 16, and Part 5 (Cat Cracking) on March 23.

The ability of the LPG's to precipitate asphalts, waxes, and heavy lube oils from crudes sounds a warning to operators planning a miscible-phase flood. This article covers the conditions under which precipitation may be encountered.

Miscible-phase floods may precipitate asphalt

The authors conclude . . .

- The application of solvent extraction or miscible-displacement efforts to certain crude oils may result in the precipitation or separation of asphalt, heavy material, and lubricating-oil fractions in the reservoir.
- The tendency toward precipitation decreases as the molecular weight of the injected miscible fluid increases.
- Precipitated asphalt or heavy material may result in disastrous effects on field experiments.
- In view of the widespread application of miscible techniques and the magnitude of some of the field experiments, a thorough study should be made prior to actually conducting the field tests.

BY ROBERT B. BOSSLER
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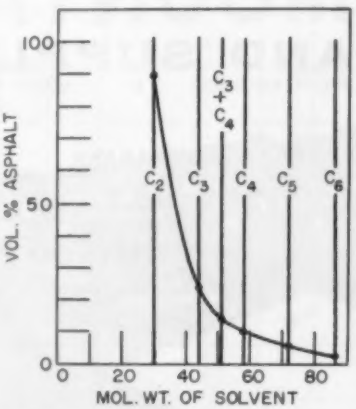
and
PAUL B. CRAWFORD
Texas Petroleum Research Committee,
A. & M. College of Texas

MANY YEARS AGO refinery technologists discovered that when liquid propane was added to crude oil almost instantly there appeared a layer or deposit of asphalt or wax depending on the temperature. The lighter crude-propane layer could be poured off if desired. In additional experiments it was found that asphalt could be precipitated by the use of ethane, propane, butane, pentane, and hexane. It was also found that if distillation would result in an asphalt deposit of 25%, substantially this quantity may be precipitated out by the use of propane. However, if butane were used only half of the material would be precipitated out and if pentane or hexane were used only one-fifth of the asphalt may be precipitated depending on the crude. With ethane, however, it might be found that as much as 90% of the original crude would exist in the heavy layer of the two-layered system.

Ethane precipitated not only all of the asphalt but also a major portion of the intermediate and heavy-grade lubricating oils. Fig. 1.[1,2,3] This precipitation of the lube-oil fractions is important since the quantity of lubricating oil contained in the crude determines to a certain extent the price of the crude. The precipitation of asphalt from a crude oil using propane is a result of two separate phenomena. The precipitation of asphalt is a colloidal phenomenon; the solubility of oil in propane is that of a true solution.

Character of Precipitate

The melting point of the precipitated bituminous material varies with the liquid used for precipitation. The asphalt precipitated with hexane has the highest melting point; and the melting point decreases as the molecular weight of the hydrocarbon used in precipitation decreases.



AMOUNT OF ASPHALT removed by precipitation is a function of the molecular weight of the solvent. Fig. 1.

Quantity Effect

The quantity of propane added to the crude oil has a very significant effect on the efficiency of the separation of asphalt at a given temperature. With the addition of a small amount of propane it has been found that the only effect is to reduce the viscosity in proportion to that which is observed when a very viscous and a very mobile fluid are added; however, upon continued addition it has been found that two layers occur.

The heavy layer contains crude oil, asphalt, and propane. The upper layer also contains some of the same three materials, but in a different proportion. If the quantity of propane is increased, the efficiency of the separation is improved so that the oil and asphalt are less and less contaminated with each other until eventually a point is reached where further addition of propane produces a little improvement in the separation of the

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oil and the asphalt. Eventually a dilution may be reached where complete miscibility is restored.

Temperature Effect

The temperature has a most unusual effect on asphalt deposition. Above 70° F., propane is a preferential precipitant. For example, it has been demonstrated that in the range of 100° to 140° F. asphalt may be but very slightly soluble in propane whereas at the same temperature both oil and wax in general dissolve completely.

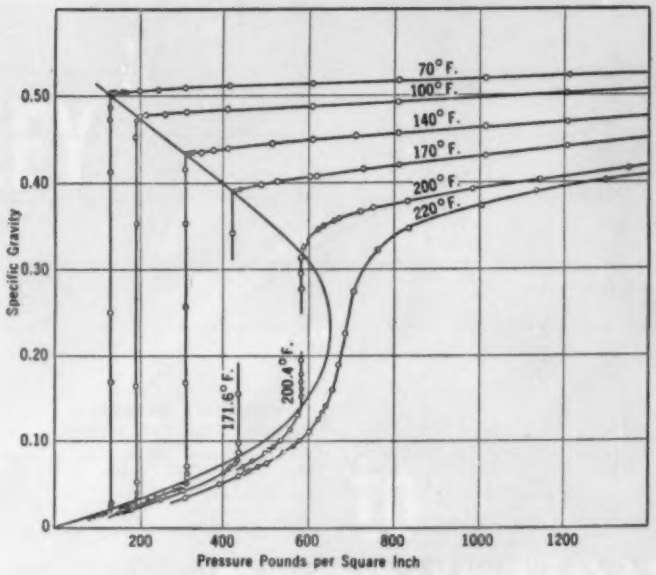
If crude oil is added to propane it would be found on commencing to heat the crude oil samples to 200° F. that at some temperature two phases begin to appear. This temperature varies considerably with the crude. Usually it is between 100° and 200° F. Substantially all of the asphalt may be precipitated out of the solution at approximately 120° F.

Pressure Effect

In the temperature interval from 100° to 200° F. and at a pressure equal to the vapor pressure of propane in solution, the surprising and novel property of propane is that instead of behaving like an ordinary liquid and dissolving more of any partially soluble substances as the temperature is raised, it actually may dissolve less. In general it is found that the heavier and more naphthenic or asphaltic compounds are precipitated out first but as the critical properties of the propane become increasingly those of gases, it dissolves less and less oil. In fact, very little oil remains in the solution just below the critical temperature of propane.

This apparent insolubility may permit one to recover by decantation a large percentage of the propane in a propane-oil solution as substantially pure propane without having vaporized it by the usual method. However, there will be some propane dissolved in the oil phase at this temperature and this portion of the propane may be recovered by distillation.[22]

Since the critical temperature of propane is near 206° F. it is apparent that several phenomena may occur as the temperature is increased. From 70° to 206° F. propane changes from a typical liquid to a fluid possessing substantially the properties of a gas. In fact, propane at a temperature of 220° F. and a pressure of 1,000 psi. is denser than liquid propane at 200° F. and saturation pressure. This is shown in Fig. 2 where it is seen that as the critical temperature is approached the compressibility of the gas increases very substantially.[18]



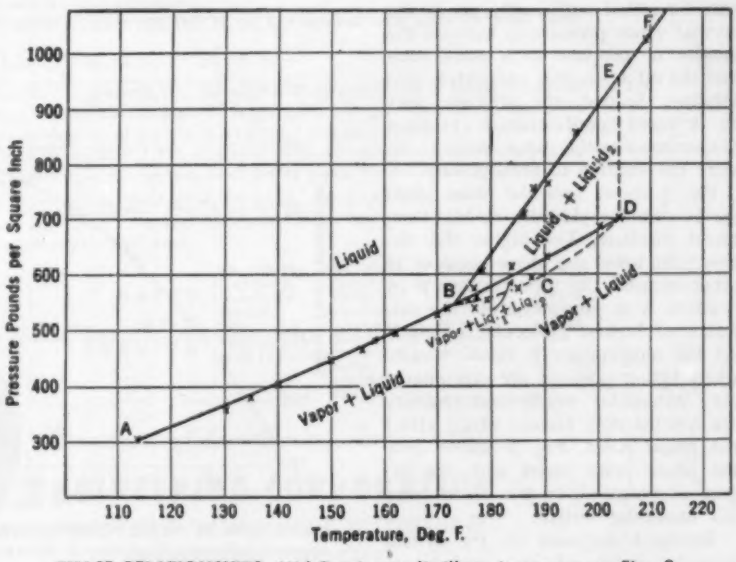
SPECIFIC GRAVITY isotherms for propane. Fig. 2.

Retrograde Effects

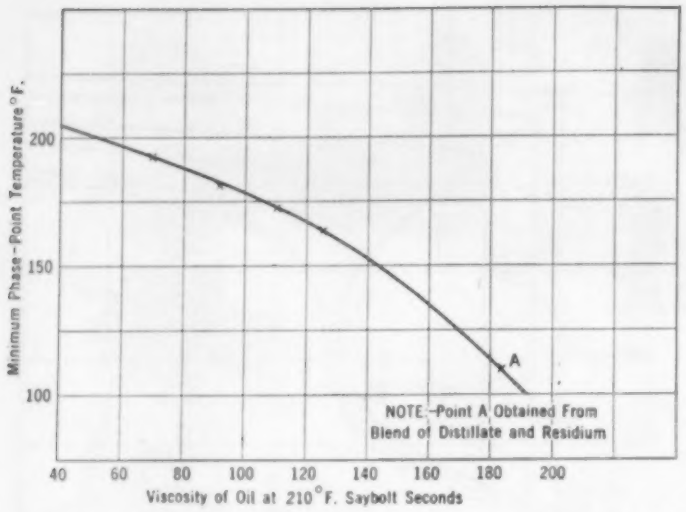
The high solubility of oil in compressed propane gas is in accord with the principles of retrograde condensation. Within certain temperature limits an increase in pressure at a constant temperature has a marked effect on the solubility relationships of complex mixtures of liquid and gas which are not observed when there are only two pure components present. Below a certain pressure such complex mixtures may be present in a homogeneous vapor state. With the increase in pressure a liquid phase separates which is richer in the high-boiling constituents than the coexisting vapor phase.

Combined Temperature and Pressure Effects

Fig. 3 illustrates quantitatively the factors which affect the solubility of oil in propane at various temperatures and pressures.[22] The data for this figure were obtained on a solution of Mid-Continent distillate in propane. The single curve to the left represents the vapor pressure of the solution of distillate in propane. Up to a temperature of 174° F. there may be only a single liquid phase present, but at this temperature a second liquid phase begins to form giving a characteristic phase point. The phase point is defined as the minimum temperature at which two liquid layers occur



PHASE RELATIONSHIPS, Mid-Continent distillate in propane. Fig. 3.



EFFECT OF OIL VISCOSITY on phase point in oil-propane mixture. Fig. 4.

TABLE 1—MISCIBLE-PHASE DISPLACEMENT FIELD EXPERIMENTS

Field trials				
Company	Field	County	State	Type of test
1. Atlantic	Block 31 Devonian	Crane	Texas	High-pressure gas
2. Atlantic	Neal		Louisiana	High-pressure gas
3. Humble	Bronte	Coke	Texas	Condensing gas
4. Humble	Zone 20 B Seligson		Texas	Gas and propane
5. Carter	Block C-2	Seminole	Oklahoma	LPG slug
6. Sun	Millican Reef	Coke	Texas	LPG slug
7. Magnolia	Parks	Midland	Texas	LPG slug
8. Conoco	Short Junction		Oklahoma	LPG slug
9. Sunray	Bisti		N. Mexico	LPG slug
10. Cities Service	Panhandle	Gray	Texas	LPG slug
11. Atlantic	Slaughter	Cochran	Texas	LPG slug
12. Sunray	Newhall-Potrero		Calif.	LPG storage and recovery

for any specific oil and propane concentration. The amount or quantity of this separate oil phase increases as the temperature rises.

It should be noted that this second liquid phase can be put back into solution in two ways. First, the pressure may be raised sufficiently above the normal vapor pressure to increase the density of propane to a point such that the oil again goes completely into solution. Second, the pressure may be lowered until enough propane evaporates into the vapor phase to restore the solution to homogeneity.

Fig. 4 shows how the phase point varies with the viscosity of Mid-Continent distillate. The higher the viscosity the lower the phase point, or in other words, the first tendency of propane is to precipitate out the materials of highest molecular weight.[22] As the temperature is raised successively lighter portions are precipitated out. Molecular weight and viscosity are not the only factors which affect the phase point. Fig. 5 shows how the phase point varies with the degree of paraffinicity for oils of similar molecular weight.

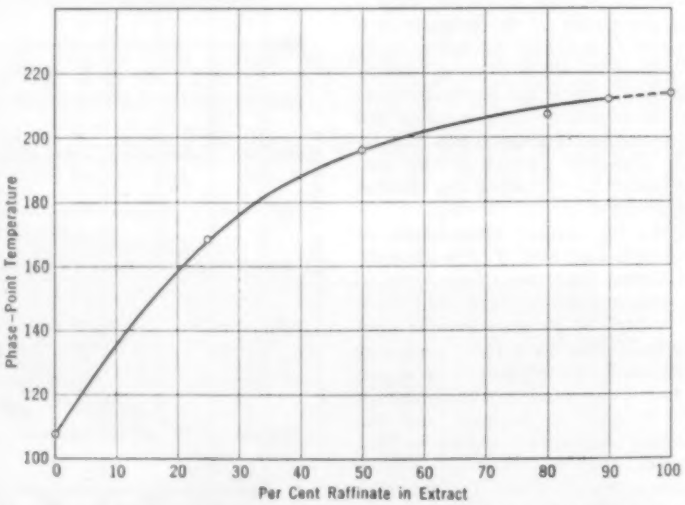
Idealized diagrams for the system propane, crude oil, and asphalt are shown in Figs. 6A, 6B, 6C, and 6D. The first figure shows the solubility curve and tie lines at approximately 100° F. The second figure shows solubility of asphalt at 140° F. The third figure shows the shape at approximately 160°, and the fourth figure shows the phase diagram at 180° F.[22]

Referring to Fig. 6C it is seen that near 175° F. crude oil and propane are no longer miscible in all proportions and that two phases begin to appear even for zero asphalt content. At this temperature a second binodal curve is projected from the propane-oil line. At 180° F. the solubility decreases and the resulting diagram is shown.

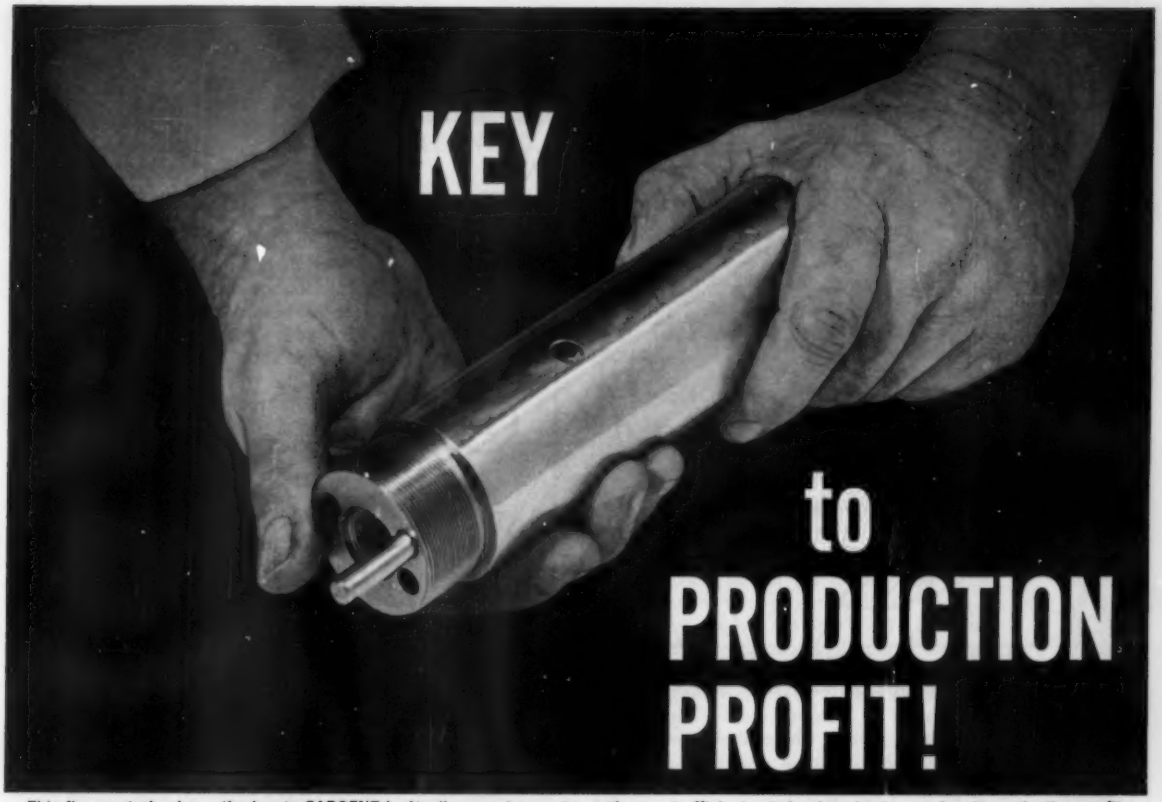
If a crude-oil mixture having the composition "m" on Fig. 6A is diluted, then the over-all system composition will lie on the line d-m, depending on the quantity of propane added. Referring to Fig. 6A it is seen that two phases will occure at a propane concentration of about 50%. If the over-all propane concentration is 70% it will be seen that the composition of the two conjugate phases will be that shown by the points "a" and "c" which are connected by the tie line through "b." The quantities of each phase are in inverse proportion to the length of the tie lines from the line d-m.

If the initial conditions are such that Fig. 6D applies and the over-all composition can be represented within the triangle a'b'c' this diagram indicates that the particular mixture will separate into three phases.

The U. S. Bureau of Mines has made many studies on the analyses of crude oils. One of these studies showed a fairly consistent relation between the carbon residue and asphalt content.[21] Fig. 7 relates the volume per cent of 100-penetration asphalt in 26 crude oils to the carbon residue of those crudes as reported in this study. Eliminating the five ob-



VARIATION IN PHASE-POINT TEMPERATURE as a function of the per cent chlorex raffinate dissolved in chlorex extract, both removed from the same Mid-Continent distillate. Fig. 5.



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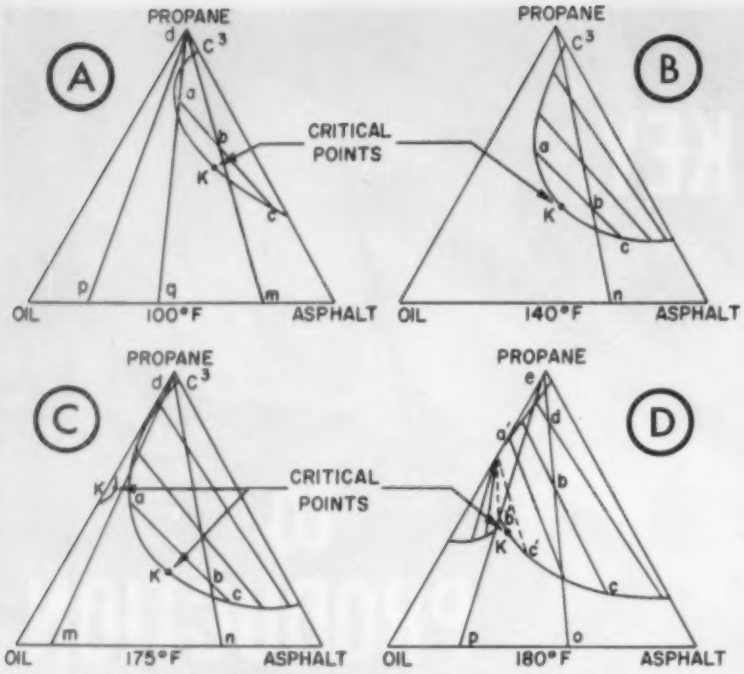


DIAGRAMS of the three-phase system, propane-crude-asphalt. Fig. 6.

viously anomalous data points, the remainder of the points fall along a line having a slope of 4.39. Since all USBM modified Hempel distillation analyses of crude oils report residual carbon, this may be a way of approximating the 100-penetration asphalt of crudes (to the extent to which this curve may be applicable to all crudes). Table 2 shows the carbon residue of some representative crudes, with computed 100-penetration asphalt content based on Fig. 7.

Fig. 8 shows a three-phase diagram obtained on a California stock.[3] It will be noted that for an initial asphalt concentration p_1, asphalt precipitation occurred at about 50% propane, and two layers occurred even at very high dilutions.

Fig. 9 shows a plot of the oil yield after precipitating a California residuum with propane.[2] The abscissa shows the ratio of the volume of propane to the volume of crude-oil stock used. The parameters show the oil yield as a function of temperature. It should be noted that for this case there was a decrease in oil yield as the temperature increased. In fact, the oil yield was as low as 20% for a propane ratio of near 10. Data obtained by Dunning and Moore on a different stock are shown in Fig. 10.[4]

Fig. 11 shows the vapor pressure of the Mid-Continent crude-oil stock containing various quantities of propane. The upper curve in the figure shows the vapor pressure of propane and the curves just below show the vapor pressure of the system when diluted with various quantities of propane. At a propane ratio of 4 to 1 it was found that the vapor pressure was approximately 25 to 50 psi. less than the vapor pressure of propane.[4]

Fig. 12 shows the relation between viscosity in S.s.U. at 210° F. for various propane volume ratios. It is evident that the viscosity of the stock may increase or decrease depending on the quantity of propane used and the temperature of separation.

The phenomena described above

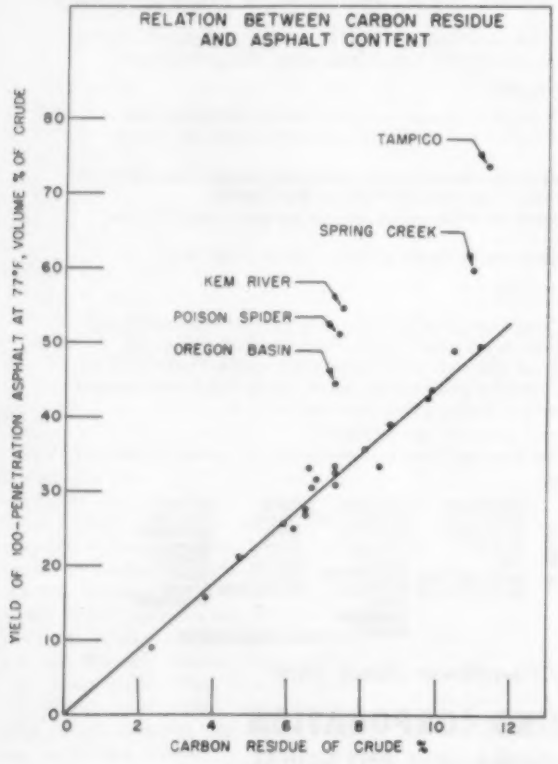
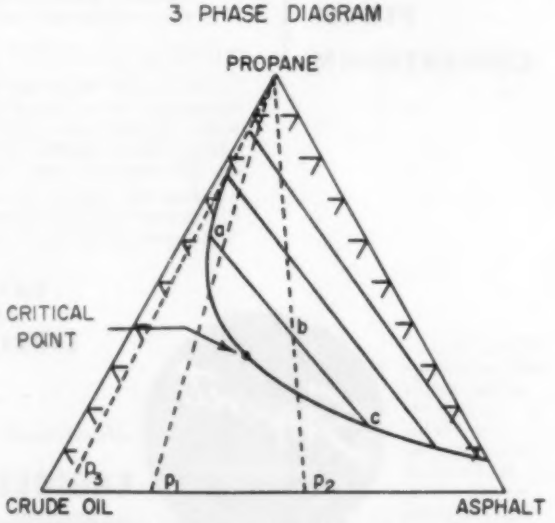


Fig. 7.



PHASE DIAGRAM for a California crude-propane-asphalt system. Fig. 8.

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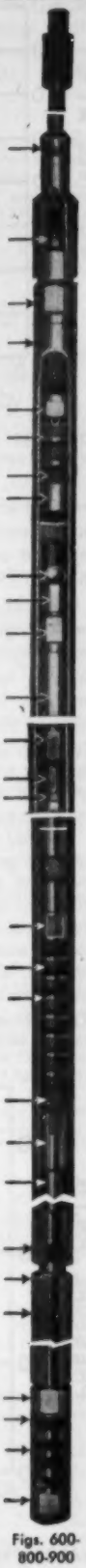

Figs. 600-800-900

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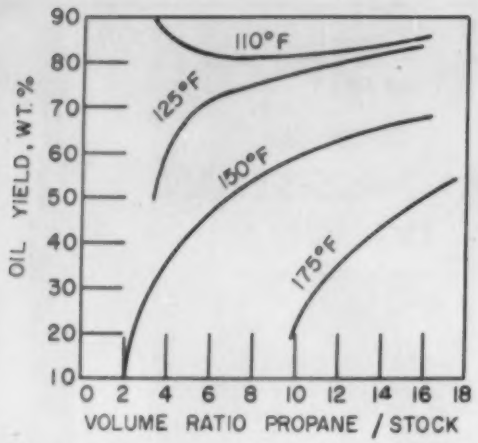
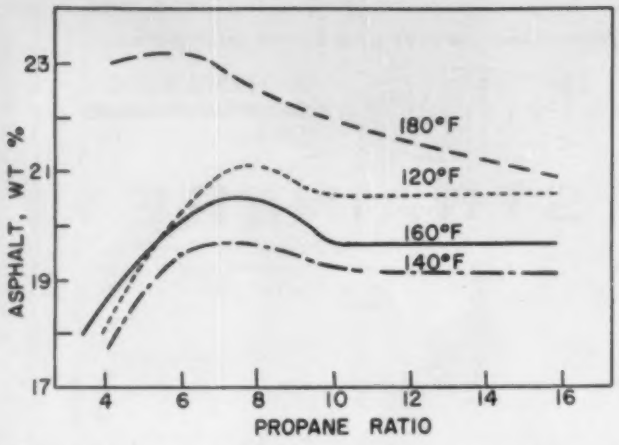


OIL YIELD of California residuum after precipitation with propane. Fig. 9.



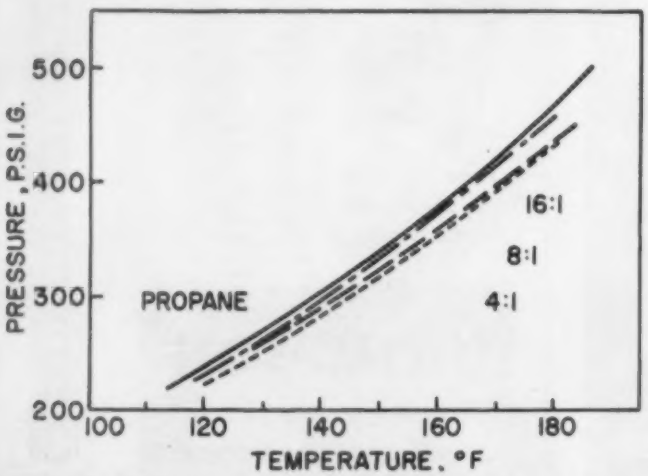
ASPHALT YIELD on a crude sample according to Dunning and Moore. Fig. 10.

were observed under "batch" conditions, presumably with thorough mixing, and controlled temperature conditions. The behavior of mixtures of LPG and crude oil in continuously varying proportions, such as would be obtained when LPG is injected into a sand containing petroleum, must be inferred from such knowledge, in the lack of experimental data. Temperature effects would be restricted to the temperature of the reservoir except for possible transient or local effects.

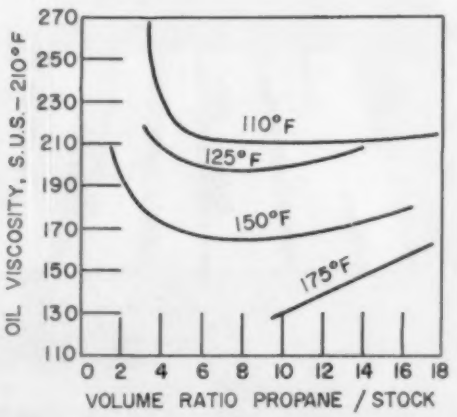
In the miscible-displacement process, the propane concentration varies from 0% at the propane-oil interface to 100% near the injection well. From the batch data presented here it is apparent that asphalt or heavy hydrocarbons will be precipitated in the transition region. Figs. 9 and 10 show that even after the transition zone has passed and the propane-to-oil ratios increase up to 15 or 20 to 1 the asphalt precipitate may still be considerable. After the extraction of the crude oil, the resulting two-phase compositions are represented by the zero crude-oil line shown in the three-phase diagram.

The asphalt in the crude oil may be dissolved in the crude oil, or it may exist as a colloidal suspension. The recent work of Witherspoon and others[18] indicates that in the oils tested by them it exists as a colloid. In either case it is dispersed throughout the crude, and makes only its normal contribution to the total resistance to flow. When precipitated by LPG or propane, it is agglomerated into larger masses, and its resistance to flow may become sufficiently great that it is no longer mobile, hence it will accumulate in the sand. In this case, as before, local clogging of the sand could become vastly important. Laboratory data indicate that this may have been a principal cause in the failure of one field miscible-displacement trial.

Since a reservoir to which some of these techniques might be applied presumably has a pressure below the bubble point of the contained crude oil, it may be assumed that a free gas phase exists. Due to LPG's high mobility, injected LPG would penetrate such a formation to some distance before an oil bank of zero gas saturation would develop. In fact, many of the processes described include a zone of mixing as a normal consequence. Laboratory work[9,24] has shown that a slug of LPG in passing through a sand becomes diluted and mixed with crude oil. A consideration or prerequisite for success in some processes is that enough LPG must be injected into the inlet end to assure that some minimum quantity of it will arrive relatively undiluted at the producing well end. It is believed, therefore, that the



VAPOR PRESSURE of propane and Mid-Continent crude-propane mixtures. Fig. 11.



RELATIONSHIP between viscosity and propane volume ratio. Fig. 12.

TABLE 2—GRAVITY, CARBON RESIDUE, AND CALCULATED ASPHALT CONTENT OF VARIOUS CRUDE OILS

Field	Producing form and age	Depth, ft.	Gravity API	Carbon res.	Computed 100-pen. asphalt vol. %
	Arkansas				
Schuler	Jones sand, Jurassic	7,572+	33.2	4.0	17.6
Smackover			20.5	7.6	33.3
Smackover	Third Zone sd. U. Cret.	2,587+	19.8	6.9	30.3
Village	Reynolds ls., Jurassic	7,388+	41.1	1.5	6.59
	California				
Belridge-North	Temblor sd., Mio.	5,457	42.6	.5	2.19
Capitan	Vaqueros sd., L. Mio.	1,280+	22.0	5.7	25.1
Elk Hills	Etchegoin sd., Plio.		23.1	4.6	20.2
Kettleman-North	Temblor-Fifth Zone, Mio.	8,130	34.0	3.2	14.1
Wilmington	Terminal sd.	3,109+	25.6	3.3	14.5
	Colorado				
Rangely	Weber sd.-Penn	5,505+	35.2	2.8	12.3
	Illinois				
Louden	Bethel, U. Miss.	1,550+	38.8	2.6	11.4
Patoka	Benoist, U. Miss.	1,378+	38.6	2.7	11.9
	Kansas				
El Dorado	Arbuckle ls., Ca-Ord.	2,406+	34.4	2.9	12.7
Silica	Lansing Penn.	3,022+	42.8	2.1	9.2
	Louisiana				
Caddo	Paluxy sd., L. Cret.	2,163+	40.6	1.8	7.90
Cotton Valley	Bodcaw, Jur.	8,572+	40.6	.2	.88
Haynesville	Trinity, L. Cret.	4,588+	34.8	4.3	18.9
Jennings	L. Mio.	7,139+	35.6	1.1	4.82
	Oklahoma				
Burbank	Burbank sd., Penn.		35.8	1.3	5.70
Cushing	Bartlesville sd., Penn.	2,552	40.7	1.3	5.70
Okla. City	Simpson, Ordo.		37.8	1.2	5.26
	Pennsylvania				
Bradford	Bradford, Dev.	1,600+	43.6	.6	2.63
	Texas				
Anahuac	Marginulina sd. Mio.	7,044+	37.4	.9	3.95
Conroe	Frio, Olig.		37.8	.3	1.32
Goldsmith	San Andres, Penn.	4,175+	34.2	2.5	11.0
Kermit	Permian ls.	2,900	28.4	3.1	13.6
K. M. A.	Ellenburger, Ord.	4,372+	42.6	.9	3.95
Spraberry			38.3	..	*11.5
Seeligson			40.5	..	* 1.2
Sugarland	Frio, Olg.		28.6	.7	3.07
Ward-North	Perm. Dolo. sd.	2,600	35.2	2.1	9.22
Yates	Perm. ls.		29.1	1.3	14.5
	Wyoming				
Elk Basin (Heavy)	Tensleep, Penn.	4,492	31.5	4.1	18.0
Grass Creek	Embar ls., Tensleep sd. Perm. Penn.		24.7	5.4	23.7
Salt Creek	Second Wall Creek, U. Cret.	2,463	36.2	5.1	4.82
Wyoming Int. Sour			35.0	..	* 9.2
Wyoming asphalt sour			24.4	..	*26.4
	Four Corners				
Aneth			40.9	..	* 8.6
Bisti			39.0	..	* 8.9
	Sicily				
Rugosa			19.8	..	*41.2
	Venezuela				
Lagunillas (Heavy)			17.8	..	*46.9
Tia Juana (Medium)			26.7	..	*29.3
Leona			24.2	..	*35.0
Mesa			30.0	..	*21.3
	Middle East				
Irak-Kirkuk			36.3	..	*14.4
Kuwait			31.4	..	*18.9
Safaniya			27.1	..	*35.0
Wafra			24.5	..	*25.0

*As reported in The Oil and Gas Journal, March 24, 1958.

necessary contact between the crude oil and the LPG will take place. If it is so, then we feel that some of the precipitation effects will occur.

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TWENTY-FIVE WELL DERRICK

The derrick on the Standard (California) — Humble drilling platform off the coast of Summerland, California, is designed for drilling two wells simultaneously and provides adequate clearance for drilling a total of twenty-five wells from one setting of the derrick. Lee C. Moore was honored to participate to the extent of the derrick and substructure.

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BUILT-IN SAFETY and fire-prevention features on Standard Oil Co. of California's Summerland platform are the most comprehensive ever provided in offshore operations. Likewise no effort was spared in preventing pollution and keeping drilling noises down. The platform's proximity to beach communities made the latter highly desirable.

The unusual caisson-type platform is being used to develop a portion of the 5,500-acre state lease Standard jointly holds with Humble Oil & Refining Co. offshore from Summerland. It is working in 100-ft. water about 2.2 miles offshore.

The platform was designed by Standard engineers after a thorough study of Gulf Coast structures. Though located on state submerged lands, the platform meets all rules and regulations for federal lands. It likewise meets all requirements of the California Division of Industrial Safety as well as those of the state legal and lands commissions.

The platform was designed to withstand the largest storms ever experienced in the Santa Barbara Channel area. It provides earthquake safety features. Most of these considerations are more than allowed for in its wave-resistance design. It can withstand lateral forces generated by waves 50 ft. high.

BY DAVE STORMONT
West Coast District Editor

Design features . . . The 167-ft. tower was towed bare to the offshore site from the National Steel & Shipbuilding Corp. yards at San Diego. Buoyance was provided by the 27-ft.-diameter, 40-ft.-high caissons on the bottom of each of four legs. Using a 90 by 300-ft. barge for stability, J. Ray McDermott & Co., the installation contractor, lowered the floating structure to the ocean floor. The caissons were jetted down through a 25-ft. overburden and anchored in place with 6,000 tons of sand and concrete.

The prefabricated 110 by 110-ft.

main deck was lifted sectionally into place 55 ft. above water, again using the huge floating crane. All other buildings and equipment were then hoisted into place to complete the double-deck structure. Included were separators, manifolds, and other flow equipment for the 25 wells which ultimately may be drilled.

Most unusual provision is for the simultaneous drilling of wells two at a time. This is made possible by a novel 140-ft. derrick which is 45 by 45 ft. at the base and 35 by 35 ft. at the watertable. Crown blocks can be moved in either direction to spot them over each well as it is drilled. Five rows of five wells each, on 6½-ft. centers, are provided for.

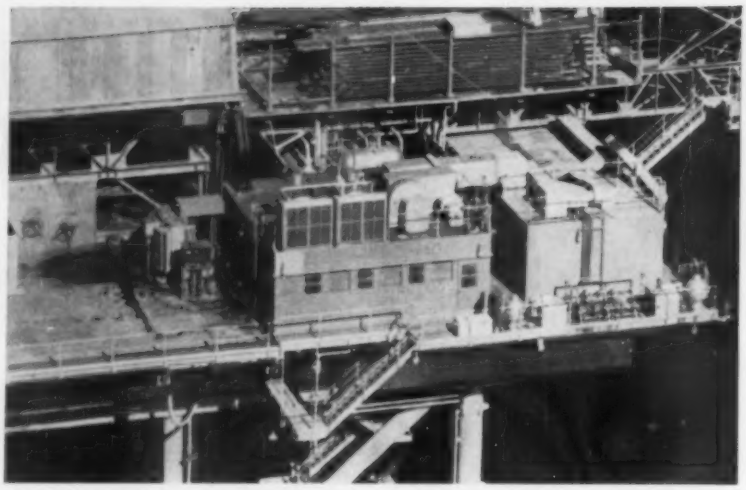
Wells are now being drilled one at a time. When additional subsurface information justifies more rapid development, a second rig will be installed. This will include an additional crown block and traveling block, independent drive rotary, draw works, and allied equipment.

To keep drilling noises to a minimum, a.c. electric equipment is used except in three instances. Two spark-plug engines in a pressurized building are used to drive emergency generators, and two diesels power the cementing pumps. The 30-ton crane likewise is diesel-powered.

Electrical equipment for one rig includes two draw-works motors, rated at 250-hp. but good for 700 hp. on an intermittent basis. The two 16-in. main pumps are powered by 700-hp. (continuous) motors and the mud-mixing pump by a 350-hp. motor. These are wound rotor, slip-ring induction motors. A 350-hp. motor powers the rotary.

Before taking up individually the several safety and well-control features provided on the platform, here is a word about two controls which override all others: Should an emergency arise which requires rapid evacuation, pushing either of two buttons will (1) operate valving which will close in all wells and vent all lines and vessels, and (2) start salt-water pumps which will, through a nozzle system, douse the well deck with 300 g.p.m of spray. Both switches are located on the principal exits to the small-boat landing.

Electrical safeguards . . . Much thought went into design of the platform's electrical system, both from the viewpoints of continuous service as well as built-in safeguards. All electrical equipment is force-ventilated, permitting unclassified equipment to be used in classified areas. In most respects the wiring, switchgear, and motors are equivalent to those used in modern refineries.



POSITIVE PRESSURE VENTILATION is applied to this generator building which houses electrical switchgear, emergency generators, and an emergency lighting panel.

Normal source of power is through a 3-in., 16,500-volt submarine cable from shore. The cable is made up of three stranded conductors, insulated and sheathed with polyethylene. Three pairs of small cables in the interstices are used for communications and for transmission of alarms to shore. The third set is expected to be used for remote-control operations after the structure becomes a production platform.

The 16,500-volt power is stepped down to 440 volts for distribution around the platform. To assure uninterrupted service if this source fails, two 200 kw. generators are provided. Driven by spark-plug engines, they start automatically if commercial power fails.

The generators supply power to radiator fans, building-ventilation fans, and an emergency lighting panel. A manual switch must be thrown before they will feed power into the platform electrical system.

All switchgear is located either in the generator building or on the elevated drilling deck. In both cases positive-pressure ventilation is provided.

Two utility fans on the roof of the generator building keep it pressurized. One fan operates continuously with the other in standby. Weighted dampers over vents provide a minimum static pressure of ¼-in. water. If the pressure drops below this level a differential-pressure switch opens and deenergizes the platform electrical system. Temporary losses in pressure, caused by opening of doors, are taken care of by a time-delay switch.

An additional safeguard is also provided in the building pressure system. If one fan does not provide the necessary pressure, an annunciator horn sounds and the second fan starts up automatically. If for some reason neither fan is operating, electric power on the platform is cut off automatically by a secondary circuit breaker.

Switchgear for the drilling controls is likewise pressurized by two blowers. Air from these is carried through a duct to nine switchgear enclosures. Each housing is equipped with a manual damper and a differential-pressure switch.

In the event the pressure drops too low in an enclosure, the switch automatically deenergizes the equipment. A waiting period, controlled by either of two timers, must elapse before power can again be applied. This assures that any hazardous vapors present in the enclosure will be purged.

Another precaution taken concerns the welding machine. This is located in the generator building. Wires from the building conduct d.c. welding power to various stations throughout the platform.

Well-flow controls . . . As the platform ultimately may hold as many as 25 producing wells, several measures are taken to shut them in if the surface controls should be damaged. These devices consist of:

Bottom-hole storm chokes are installed in all wells as they are completed. They are primarily used to shut in a producing well should the tubing be pierced by a drilling well. The chokes close if the pressure differential across the valve increases as a result of higher flow rates. They are wire-line retrievable.

Ball safety valves are placed in the tubing about 100 to 200 ft. below the ocean floor. They likewise are wire-

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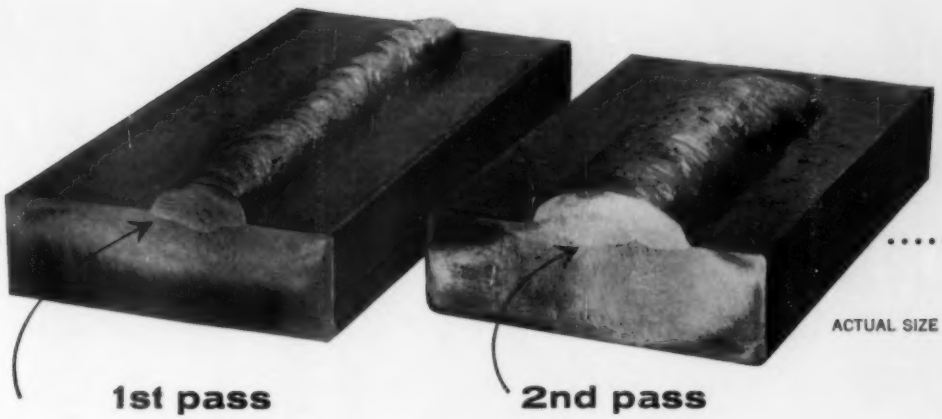

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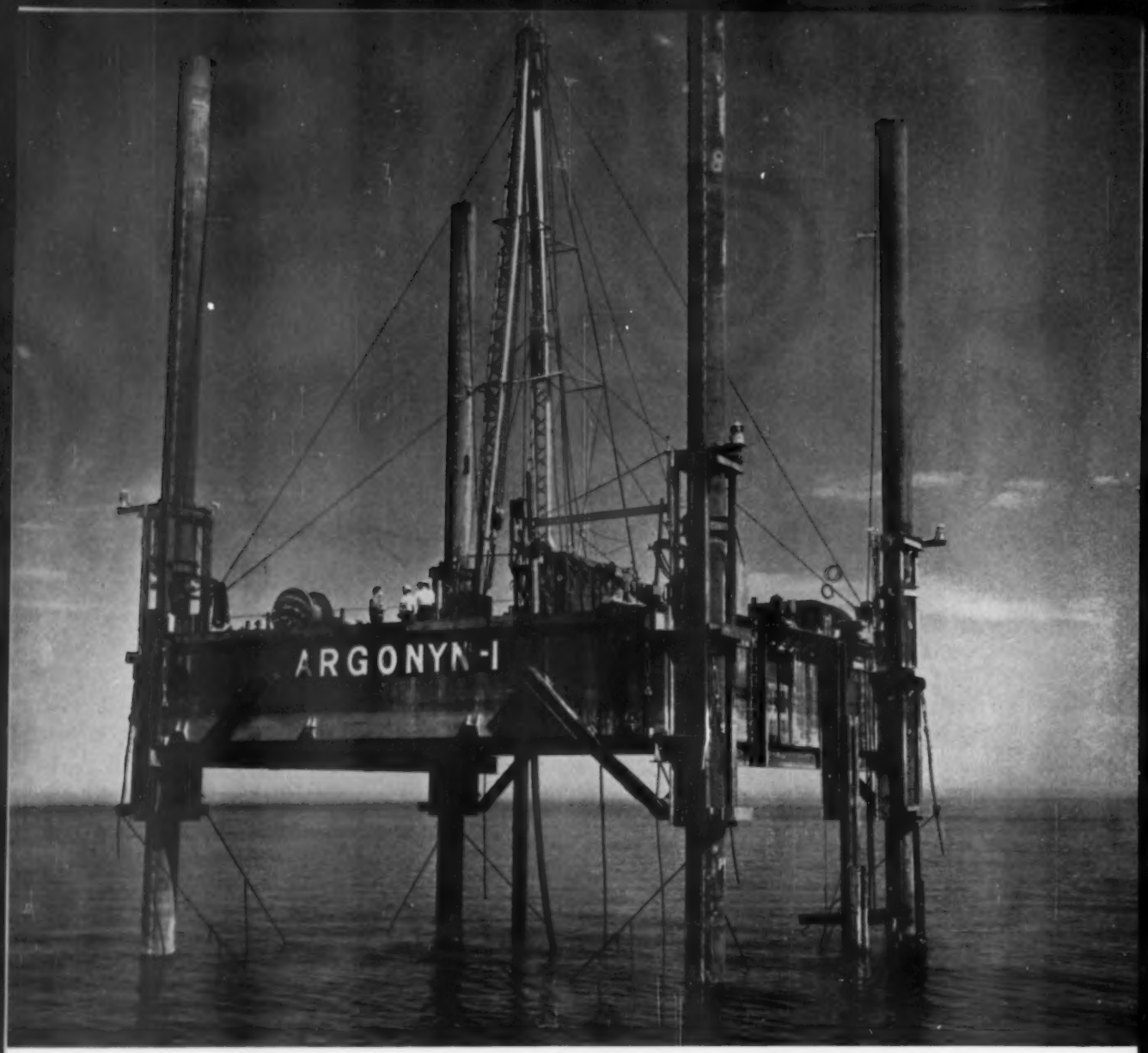

Drilling for Gas beneath Lake Erie. Seven-tenths of a mile off the Pennsylvania shore of Lake Erie, the Argonyn I was recently photographed drilling for gas with a powerful spudder. The Argonyn, owned by the New York State Natural Gas Corporation, is the first outfit to do offshore work on the American side of the lake. The job shown here was handled by Acme Drilling Co., which had been engaged by the rig-owner to sink the well.

At the time of the picture, the rig was set up in 35 ft of water. The cable-tool drilling line was Bethlehem 1-in. Type U, left lay; the sand line, 9/16-in. 6x7 right lay. To provide for depths expected before completion, the planning called for a later installation of ⅞-in. Type U drilling line, 7000 ft long.

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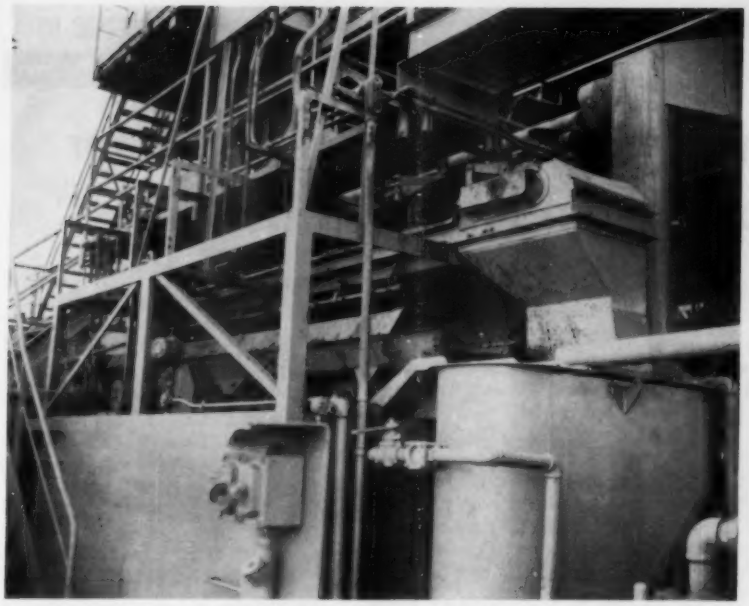


IN THIS UNIQUE CLEANING SYSTEM, cuttings and drilling mud are stripped free of oil so that they can be disposed of at the drill site. Cuttings from the mud screen drop onto a lower screen where they are washed with salt water and detergents.

line retrievable. They are hydraulically closed if pressure is released from the platform hydraulic control system in any one of three ways:

1. When the flowing pressure in a well decreases to a lower limit, a pilot valve bleeds off the hydraulic pressure.

2. Operation of an emergency valve at the small-boat landing will cause all the valves to close and shut in all producing wells.

3. Should a ship crash into the platform and shear a well's producing pipe, the hydraulic line also would be severed and all ball safety valves would close.

A wellhead shutoff valve is installed in the flow line of each well. These valves operate automatically and shut in the wells if any of the following occurs: (1) the level in the oil and gas separator builds up too high, (2) the pressure in the pipeline to shore becomes too high or too low, or (3) if the pressure in the flow line between the well and the separator becomes too high.

In addition, a special emergency shutdown valve is provided at the small-boat landing. Operation of this valve causes all flow-line valves to close.

Any gas vented on the platform is first passed through a scrubber before it is stacked through 10 and 16-in. pipes on one corner of the derricks. To assure no fluid is stacked, the scrubber is equipped with a high-level alarm. If the fluid level exceeds the safe limit, a horn will sound and an appropriate light will flash on the control panel.

Gas detector system . . . As the drilling structure is to serve also as a production platform, a gas-detector system is provided to give warning if gas is present in hazardous concentrations. Two areas are covered. The well area on the well and tankage deck has four sensing units: the trap area on the main deck has one. All instruments are connected to an electronic gas-detecting panel mounted in an explosionproof enclosure on the well deck.

If gas is detected by a unit, a horn sounds and lights on the panel indicate whether the danger lies on the well deck or in the trap area. If it is the former, a visit must be made to the well area to determine which unit was activated.

An extra precaution is provided in the event any of the electronic equipment fails. Should this happen the horn sounds and a "trouble" light on the panel will flash.

Fire-fighting equipment . . . In the event fire should break out, various means are available for bringing it under control. Fighting methods available include portable carbon dioxide units, fire hoses, automatic sprinkler system, and a fog nozzle system.

The automatic sprinkler system is located over the well and tankage deck. It consists of 26 individually activated sprinkler heads. The fog nozzle system also covers the wellhead area. Each side of the two compartment area is covered by three nozzles, each capable of delivering 50 to 75 g.p.m. of water at 100 psi.

Water for fire fighting is supplied by two salt-water pumps located at the platform's small-boat landing. Both pumps can be operated by push buttons located near the pumps, one on the derrick floor, and from three stations on the main deck. In the event the platform must be abandoned, it can continue to be slugged with water through the nozzle system from a pump-equipped boat.

Antipollution measures . . . Because the platform is situated in the heart of a sports-fishing area and the nearby beaches are dotted with homes, all steps possible to prevent pollution are taken.

To prevent any spilled oil or other waste from reaching the ocean, all decks slope outward. Gutters around the edges collect all liquids and start them toward a central treating plant. Though pollution rules permit it to be as high as 50 p.p.m., oil content of the discharged water is reduced to 10 p.p.m. in the 1,000-bbl.-daily capacity air-flotation cell.

Clean cuttings and waste drilling mud are dumped on the ocean floor, but only after they have been thoroughly scrubbed to remove any oil. In a unique cleaning system, they are washed with salt water and oil-emulsion-breaking chemicals. Water from this process then is run to the flotation cell for cleaning.

The 8-in. disposal line which conducts the cuttings down to the ocean floor also serves as a final oil skimmer. A sump pump periodically removes any oil which may be washed from the cuttings as they work their way downward through almost 100 ft. of seawater.

Contaminated cuttings are bypassed from the mud screen directly to a storage bin. There a conveyor screw moves them down a chute to a service boat for disposal on shore. Oil skimmed off in the flotation cell, and that recovered by the sump pump likewise is hauled to shore.

"A special emergency shutdown valve . . . at the small-boat landing . . . causes all flow-line valves to close."

Reference

1. The Oil and Gas Journal, June 9, 1958, p. 111.

Effect of technological improvements (labor productivity) on cost indexes

BY W. L. NELSON
Technical Editor and Petroleum Consultant

How do cost indexes such as your Refinery Construction Cost Index, account for changes in the productivity of labor? R.J.B.

Almost all indexes other than those that are simply a record of past performance, have no provision in them for changes in the productivity of labor. They are primarily indexes of prices and wages without regard to how much labor may be required to assemble and erect the material. Of course, revisions may be contemplated in connection with some of the indexes, or conditions may necessitate such revisions.

Most of those who are concerned with productivity are really concerned with the effect of productivity on costs rather than the effect on cost indexes.

The productivity of labor is introduced into cost (actually price) indexes by the proportion of labor cost and material costs that is employed. However, the proportion is also governed to a large extent by the wage rate. As wages rise, the productivity also tends to rise unless the increase in wages is caused totally by inflation. And if labor legislation becomes too strong an influence we can encounter a lower productivity per dollar spent for labor at the very time that great advances in productivity, based on work accomplished per hour, are being accomplished. Such a condition has been approximated during the last few years.

Business Climate

Another factor is the tone of business conditions. Productivity tends to decrease during times of business stagnation, because management must retain at least some of its labor force even though little is being produced. At the other extreme, productivity also tends to decrease during boom times when profits are too easy to maintain because management tolerates employes whose contribution to the job at hand is not evident.

The over-all tendency in a healthy and growing economy, however, is an improving productivity. This means that labor should constitute less and less of the total cost of construction unless inflation of the currency occurs more rapidly than improvement in productivity. If inflation prevails, then labor may constitute a greater rather than a smaller part of the total cost of construction.

Still another factor is introduced by the cost of tools or labor-saving devices by which the increase in productivity is attained. This adds to the rental or field costs that are usually handled in construction indexes as part of the labor cost.

Finally, feather bedding tends to overcome productivity improvements during good times and the necessity of maintaining at least a skeleton staff during poor times tends also to counteract increased productivity.

Thus only over long periods of time are the effects of technological improvement clearly evident although in certain special situations, such as possibly pipeline construction, there may be a clear pattern of increasing labor productivity. Even then the rate of improvement must in time come back to normal.

A Constant Value

In summary, the whole purpose of society is to obtain more goods for its labors, i.e. higher and higher real wages. Thus although technological improvements, inflation, labor legislation, booms, and busts all work at disturbing the ratio of labor cost (not wages) to materials cost, in time the various factors tend to nullify each other with the result that cost for labor and cost for materials stand at a somewhat constant value.

This applies to the whole economy but, of course, various segments of industry will at times vary from the normal. Yet, even an industry that is undergoing technological labor-saving improvements must in time revert to normal and even during the technological advance, there is a tendency for management to permit the hiring of more employes than actually required.

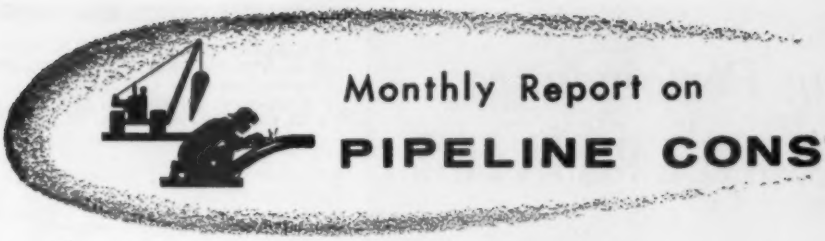
TABLE 1—EFFECT OF PROPORTIONS OF LABOR AND MATERIAL ON COST INDEXES.

	Cost Indexes for these percentages of Labor:		
	L=50	L=60 (Nelson Index)	L=70
1926	74.6	72.0	69.4
1930	71.2	70.3	69.4
1935	64.7	62.7	60.8
1940	78.3	77.6	76.8
1945	89.3	89.9	89.9
1946	100	100	100
1950	146.7	146.2	145.7
1955	182.8	184.2	185.6
1957	205.2	205.9	206.6

As to the specific effect of technological improvement on cost indexes, note Table 1 which is based on the Nelson Refinery Construction Cost Index. The Nelson Index is based 60% on labor (wages) and 40% on material prices. If productivity or other effects cause the percentage of labor to vary from 60%, the effects are not great. In 1935 and 1926, the possible error may amount to more than 3%, but since 1946, scarcely any error due to technological improvements seems possible.

Concern over the effect of productivity on cost indexes probably arises in part because the immediate effect of increased productivity is a lower cost. This is not basically true (except during a short period or for a short period in fortunate industries) because increased productivity is soon reflected in higher wages.

Figures determined by the Interstate Commerce Commission on the cost of pipeline construction (Questions on Technology, OGJ, Mar. 31, 1958, p. 102) indicate a great improvement in labor productivity since 1942. However, when these same figures are analyzed for the percentage of material and labor involved each year, unrealistic proportions are obtained. In general, however, it seems that a normal ratio of material to labor is tending to be reestablished.



Monthly Report on PIPELINE CONSTRUCTION

PIPELINE ACTIVITY reported here is compiled from surveys by The Oil and Gas Journal among pipeline companies and construction contractors.

This summary report appears in the last issue of the Journal each month. New construction projects are reported weekly in Pipeline Briefs in the Journal's news section.

Projects are listed in three groups —U. S., Canadian, and Foreign— and according to type of line—crude, products, or natural gas.

U. S. Crude Oil Pipelines

• **Ashland Oil & Refining Co.**, Ashland, Ky.
Project: 42 miles of 6-in., 30 miles of 8-in., 2 miles of 10-in. from near Greensburg to Louisville, Ky.
Status: Under way.
Completion: March 1, 1959.

• **Cape Pipe Line Co.** (Sun Oil Co., Cities Service Co., Atlantic Refining Co.), Philadelphia.
Project: Line from lower Delaware Bay to Philadelphia.
Status: Planned.
Completion: 1960.

• **Gillette Pipeline, Inc.**, and **A. W. Hartwig, Inc.**
Project: A 102-mile line from Dead Horse Creek field to Casper, Wyo.
Status: Pending Wyoming Public Service Commission approval.

• **Great Northern Railway Co.**
Project: 400 to 600 miles of 12 to 20-in. from Williston basin in Mont. and N. D., to Clearbrook or St. Paul, Minn.
Contractor: **Pipe Line Technologists, Inc.**, Houston, has completed feasibility study.

• **Husky Oil Co.**, Cody, Wyo.
Project: Gathering lines to the refinery at Cody.
Status: Planned.

• **International Oil Pipeline Corp.**, New York City.
Project: Would own U. S. section of 1,500-mile, 30-in. line proposed by Mid-Continent Pipe Lines, Ltd., from Edmonton, Alta., to Chicago. (See Canadian Crude-Oil Pipelines).
Status: Pending Canadian Board of Transport Commission approval.

• **Mid-Continent Pipe Line Co.**, Tulsa.
Project: Lines in Okla.: 3 miles of 10-in. from Duncan to Velma; 6 miles of 8-in. from Cromwell to Tiger Creek Junction; 5 miles of 6-in. from Key West to Beggs; 12 miles of 8-in. from Drumright to Tulsa; 7 miles of 4-in. from Key West to Davenport.
Status: Planned.
Completion: 1959.

• **Service Pipe Line Co.**, Tulsa, Okla.
Project: 9 miles of 10-in. from Snyder to Colorado City, Tex.
Status: Planned.
Completion: November 1959.

• **Shell Pipe Line Corp.**, Houston.
Project: 13 miles of 8-in., 11 miles of 12-in., 31 miles of 16-in. from Miss. Delta area to Norco, La.
Status: Under way.
Contractor: **Glaser Construction Co., Inc.**, Lafayette, La.; **J. Ray McDermot Co., Inc.**, Harvey, La.
Completion: March 1959.

• **Teton Pipeline Co.**, Denver.
Project: 8 miles of 5-in. to connect O'Brien field, Carbon Co., Wyo., with the Sinclair Pipe Line system.
Status: Planned.

U. S. Products Pipelines

• **Buckeye Pipe Line Co.**, N. Y. C.
Project: 70 miles of 8-in. from Wayne to Flint, Mich.
Status: Planned.
Completion: Mid-1959.
Project: 11 miles of 6 in. from Syracuse-Utica line to Griffiss AFB, Rome, N. Y.
Status: To start in March.
Contractor: **Sheehan Pipe Line Construction Co.**, Tulsa.
Completion: Spring 1959.

• **Everglades Pipe Line Co.**
Project: 35 miles of 10-in. from Port Everglades, Fla., to Miami's International Airport.
Status: Planned.
Completion: 1959.

• **Husky Oil Co.**, Cody, Wyo.
Project: Line from Cody to the Yellowstone products line west from Billings, Mont.
Status: Planned.

• **Katy and New York Central Railroads.**
Project: 2,500 miles of 10-in. and smaller LPG line from Houston through Kansas City, St. Louis, Indianapolis, and Cleveland to Syracuse, then down to New York City. A branch would go through Chicago to Detroit.
Status: Proposed.
Contractor: **Williams Brothers Co.**, Tulsa, has completed feasibility study.
Completion: November 1, 1959.

• **Phillips Petroleum Co.**, Bartlesville, Okla.
Project: 34 miles of 3-in. in Borger, Tex., area.
Status: Planned.
Completion: 1959.

• **Texas Eastern Transmission Corp.**, Little Big Inch Division, Houston.
Project: 63 miles of 8-in. from Tyler to Carthage, Tex.
Status: To start spring 1959.
Completion: Summer 1959.

U. S. Natural Gas Pipelines

• **American Louisiana Pipe Line Co.**, Detroit.
Project: 28 miles of 12-in. Big Lake, La., gathering lines.
Status: Pending FPC approval.
Completion: March 1959.

• **Arkansas Industrial Pipeline Corp.** (Arkansas Louisiana Gas Co.), Shreveport, La.
Project: 130 miles of 18-in. from Perla to Helena, Ark.
Status: Under way.
Contractor: Company forces.
Completion: 1959.

• **Arkansas Louisiana Gas Co.**, Shreveport, La.
Project: A 300-mile line, plus gathering lines, from Tex.-La. coastal area to northern La., to connect with present system.
Status: Proposed.
Project: 100 miles of 16-in. from Clarksville to Perla, Ark.
Status: Under way.
Contractor: Company forces.
Completion: 1959.

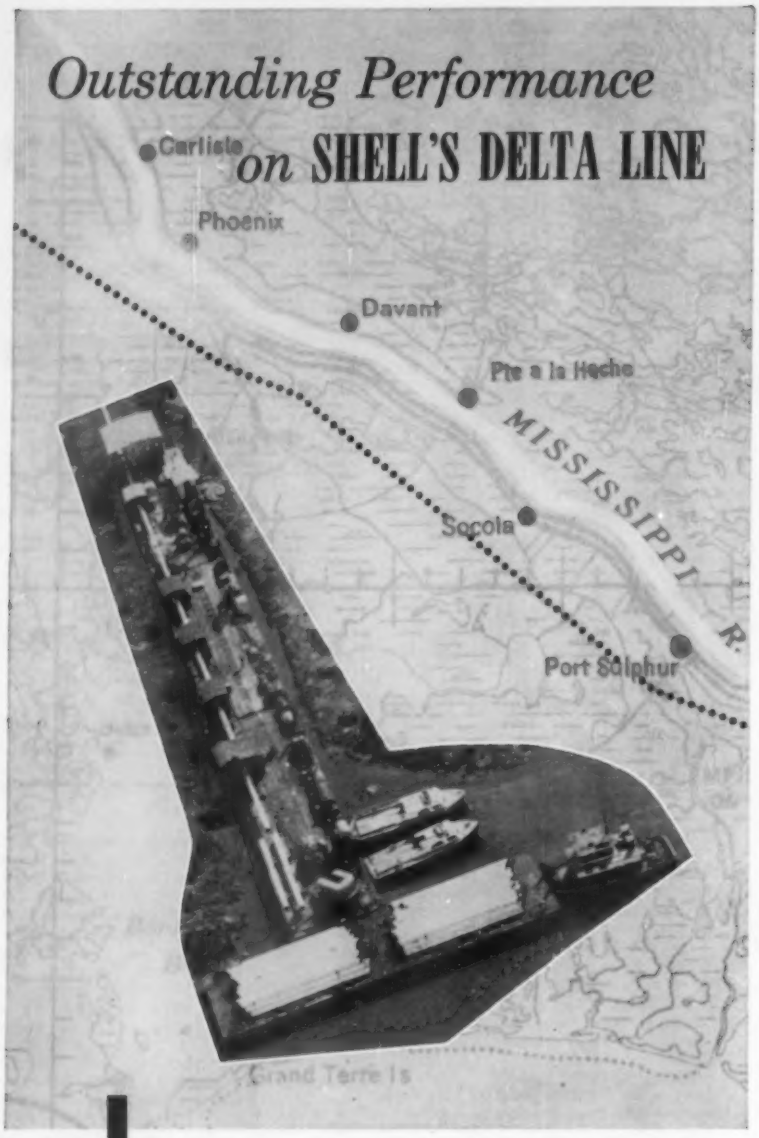
• **Central Hudson Gas & Electric Corp.**, Poughkeepsie, N. Y.
Project: 13 miles of 10-in. from Highland to Kingston (Part II), N. Y.
Status: Planned.
Completion: 1960.

• **Chicago District Pipeline Co.**
Project: 50 miles of 36-in. from Joliet to Chicago.
Status: Pending FPC approval.
Completion: Fall 1959.

• **Coastal Transmission Corp.**, Houston.
Project: 147 miles of 20-in. from Robstown to Bay City, Tex.; 68 miles of 22-in. from Bay City to Galveston Bay, Tex.; 252 miles of 24-in. from Galveston Bay to Baton Rouge, La.
Status: Under way.
Contractor: **Oklahoma Contracting Co.**, Dallas, has 130 miles of 24-in. from Baton Rouge to Lake Charles, La., Leamon Creech, supt., office at Port Barre, La., and 147 miles of 20-in. from Robstown to Bay City, Tex., Ed Peters, supt., office at Robstown. **Brown & Root, Inc.**, Houston, has 11 miles of 24-in. across Galveston Bay. **River Construction Co.**, Fort Worth, has 105 miles of 24-in. from Galveston Bay to north of Lake Charles, La., to complete May 1, 1959, T. M. Tatom, spread supt. **Buddy Sherrod, Inc.**, Conroe, Tex., has the Natchez River crossing between Beaumont and Port Arthur, Tex. **Sharman, Allen, Gay & Taylor, Inc.**, Houston, has 63 miles of 22-in. between Bay City, Tex., and Galveston Bay.
Completion: May 1, 1959.
Project: 320 miles of 3 to 14-in. gathering lines at various locations on Tex. and La. Gulf Coast.
Contractor: **Barry Construction Co.**, Pearland, Tex., has 63 miles of 3 to 8-in.
Completion: April 1959.

• **Colorado Interstate Gas Co.**, Colorado Springs, Colo.
Project: 109 miles of 26-in. from Four-Way station in Tex. Panhandle, to Morton Junction in southeastern Colo.; 135 miles of 34-in. from there to Pueblo, and 100 miles of 30-in. on to Denver; 148 miles of 34-in. from CIG line at Rock Springs, Wyo., to Provo, Utah, to connect with proposed El Paso Natural Gas Co.'s line to Calif.
Status: Planned.
Completion: January 1, 1960.

• **Consumers Power Co.**, Jackson, Mich.
Project: 40 miles of 24-in. from Woodbury station to Laingsburg Junction, Mich.
Status: Planned.
Completion: July 15, 1959.
Project: 120 miles of 26-in. from Mich.-Ind. border connection with Trunkline Gas



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102

PIPELINE CONSTRUCTION

Co., to Plymouth, Mich., and 20 miles of 24-in. from Northville to Clarkston, Mich.
Status: Planned.
Completion: September 1, 1959.

• **El Paso Natural Gas Co.,** El Paso, Tex.
Project: 51 miles of 20-in. from Terrell to Puckett, Tex., and 34 miles of 20-in. from Puckett tie-in to Goldsmith, Tex.
Status: Planned.
Project: 119 miles of 30-in. Permian-San Juan Line loops.
Status: Planned.
Completion: November 1959.
Project: 87 miles of gathering lines in Bisti field in San Juan Co., N. M.
Status: Has temporary FPC approval.
Project: 400 miles of 34-in. from Salt Lake City, to Calif. border near Las Vegas, Nev.
Completion: January 1960.

• **Gulf Interstate Gas Co.,** Houston.
Project: 10 miles of 12-in. supply loop to Erath field, Vermilion Parish, La., and 9 miles of various-size field lines in Acadia and Vermilion parishes, La..
Status: Approved.
Project: 10 miles of 20-in. loop in Jefferson Davis and Vermilion parishes, La., and 3 miles of 6-in. loop in Cameron Parish, La.
Status: Has temporary FPC approval.

• **Gulf Resources, Inc.,** New York.
Project: 136 miles of 14 and 20-in. from Hidalgo County to LaSalle County, Texas.
Status: Pending FPC approval.

• **Houston Texas Gas & Oil Corp., St.** Petersburg, Fla.
Project: 679 miles of 24-in. from Baton Rouge, La., to Kissimmee, Fla.; 138 miles of 18-in. and 97 miles of 20-in. from Kissimmee to Cutler, Fla.; 702 miles of 3 through 18-in. sales laterals in Fla. Main line will join Coastal Transmission's line from McAllen, Tex., to Baton Rouge, La.
Status: Under way.
Contractor: **Midwestern-Walco Contractors,** St. Petersburg, Fla., has the 24-in. with spread offices at Denham Springs, La., Lacedale, Miss., and Vernon, Fla. **Harbert Construction Corp.,** Birmingham, has remainder, of which 150 miles of 3 to 16-in. Fla. laterals have been subcontracted to **Mid-States Construction Corp.,** Mt. Vernon, Ill.
Completion: June 1959.

• **Humble Oil & Refining Co.,** Houston..
Project: 238 miles of 30-in. from King Ranch plant to Clear Lake plant near Houston.
Status: Under way.
Contractor: **Panama, Inc.,** Houston.
Completion: January 1, 1960.

• **Iron Ranges Natural Gas Co.,** St. Paul.
Project: 70 miles of 6 to 16-in. in Mesabi Iron Range area.
Status: Pending FPC approval.
Completion: 1959.
Project: 63 miles of 12-in. between Duluth and Silver Bay, Minn.
Status: Pending FPC approval.
Completion: 1959.

• **Manufacturers Light & Heat Co.**
Project: 61 miles of 20-in. (to replace 135 miles of old 6-in.).
Status: Pending FPC approval.
Completion: Fall 1959.

• **Michigan Consolidated Gas Co.,** Detroit.
Project: 67 miles of 10, 12-in. between Sears and Traverse City, Mich.
Status: Under way.
Contractor: **Somerville Construction,** Ada, Mich., Floyd Huduall, supt., office at Cadillac, Mich.
Project: 60 miles of 10, 12-in. between Muskegon and Ludington, Mich.
Status: Under way.
Contractor: **Somerville Construction Co.,**

PIPELINE CONSTRUCTION

Ada, Mich., jointly with **H. L. Gentry Construction Co.**, Jackson, Mich., Frank Morris, supt., office at Hart, Mich.

- **Michigan Wisconsin Pipe Line Co.**, Detroit.

Project: 373 miles of 24-in. main line loop; 21 miles of 16-in. loop in Wis.
Status: To start March 1959.
Completion: July 1, 1959.

- **Midwestern Gas Transmission Co.**, Houston.

Project: 350 miles of 30-in. from Portland, Tenn., to Joliet, Ill.
Status: Pending FPC approval.
Completion: Planned for 1959.

- **Mississippi River Transmission Corp.** (Mississippi River Fuel Corp.), St. Louis.

Project: 115 miles of 24-in. from near Oran in southeast Mo., north between Ste. Genevieve and Bonne Terre into vicinity of Herculaneum and Pevely then into St. Louis Co.
Status: Planned.
Completion: Last half 1960.

- **Mountain Fuel Supply Co.**, Rock Springs, Wyo.

Project: 5 miles of 8-in. and 1 mile of 6-in. south of Rock Springs, Wyo.
Status: Planned.
Completion: July 1959.

- **New York State Natural Gas Corp.**, Pittsburgh.

Project: 43 miles of 20-in. from Kittanning to Luthersburg, Pa.
Project: 14.5 miles of 26-in. from Chatham Township to Lawrenceville, Pa.
Status: Planned.
Completion: 1959.

- **Niagara Mohawk Power Corp.**, Syracuse, N. Y.

Project: 100 miles of 12-in. from Watertown to Massena, N. Y.
Status: Planned.
Contractor: **Fulghum Contracting Corp.**, Harrisburg, Pa.
Completion: August 1, 1959.
Project: 26 miles of 12-in. from Volney to Ellisburg, N. Y.
Status: Under way.
Contractor: **Consolidated Gas & Service Co.**, Chicago.
Completion: May 1, 1959.

- **North Carolina Natural Gas Corp.**, Fayetteville, N. C.

Project: 730 miles of 2 to 16-in. from near Mooresville, eastwardly across N. C.
Status: Under way.
Contractor: **J. P. Neill & Co., Inc.**, Dallas, 112 miles of 16-in.; **Somerville Construction Co.**, Ada, Mich., 386 miles of 2 to 12-in.; **C. N. Flagg & Co.**, Meriden, Conn., 102 miles of 3 to 6-in.
Completion: April 1, 1959.

- **Northern Illinois Gas Co.**

Project: 140 miles of 24-in. from Des Plaines to East Dubuque, Ill.
Status: Pending FPC approval.
Contractor: **Williams Brothers Co.**, Tulsa, has completed engineering and right-of-way studies.

- **Northern Natural Gas Co.**, Omaha, Neb.

Project: 217 miles of main line, 221 miles of main-line loops, 1,906 miles of branch lines of various diameters.
Status: Pending FPC approval.
Completion: 1959-61.
Project: 18 miles of 20-in. from Dubuque, Iowa, to Menominee, Ill.
Status: Pending FPC approval.
Project 19 miles of 30-in. from Oakland to Ogden, Iowa.
Status: Pending FPC approval.
Project: 9 miles of 30-in. from Palmyra to Beatrice, Neb.
Status: Pending FPC approval.

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PIPELINE CONSTRUCTION

Project: 11 miles of 30-in. from Clifton to Tescott, Kans.
Status: Pending FPC approval.
Project: 8 miles of 30-in. from Tescott to Bushton, Kans.
Status: Pending FPC approval.
Project: 11 miles of 30-in. from Sunray, Tex., to Beaver, Okla.
Status: Pending FPC approval.
Project: 8 miles of 30-in. from Beaver, Okla., to Mullinville, Kans.
Status: Pending FPC approval.
Project: 169 miles of 20-in. from Farmington, Minn., to Superior, Wis.
Status: Pending FPC approval.
Project: 23 miles of 24-in. main line loop in Neb.
Status: Pending PFC approval.
Project: 44 miles of 16-in. in Duluth-Superior, Wis., area.
Status: Pending FPC approval.
Project: 57 miles of 30-in. main line loop in Iowa, Minn., Neb. and Kans.
Status: Pending FPC approval.
Project: 188 miles of 24-in. and 215 miles of 30-in. from Farmington, Minn., to International border.

- **Northern Oklahoma Gas Co.**, Ponca City.
  Project: 75 miles of 12-in. from Cherokee to Ponca City, Okla.
  Status: Under way.
  Completion: May 1959.
- **Northern Utilities Co.**, Casper, Wyo.
  Project: 35 miles of 16-in. in Fremont-Natrona counties, Wyo.; 8 miles of 12-in. near Casper, Wyo.; 6 miles of 8-in. from Sand Draw gas field to Beaver Creek field, Wyo.; 12 miles of 6-in. from Beaver Creek field to the system servicing the Riverton-Lander, Wyo., area.
  Status: Planned.
- **Offshore Gathering Corp.**, Houston.
  Project: 364 miles in Gulf of Mexico off La.: 60 miles of 24-in., 70 miles of 26-in., and 234 miles of 30-in. dual line.
  Status: Pending FPC approval.
- **Pacific Gas & Electric Co.**, San Francisco.
  Project: 131 miles of 34-in. looping of Topock-Milpitas main line.
  Status: Planned. Pending FPC approval.
  Completion: 49 miles in 1959; 82 miles in 1960.
  Project: 42 miles of 30-in. from Pittsburg to Irvington, Calif.
  Status: Planned.
  Completion: 11 miles in 1959; 31 miles in 1960.
  Project: 296 miles of 36-in. from Klamath Falls, Ore., to Antioch, Calif.
  Status: Pending Canadian export permit and FPC approval.
  Completion: December 1960.
- **Pacific Gas Transmission Co.** (Pacific Gas & Electric, San Francisco).
  Project: 614 miles of 36-in. from Kingsgate, B. C., to California border near Klamath Falls, Ore.
  Status: Pending approval of FPC and Canadian authorities to import gas. To start late 1959.
- **Pacific Lighting Gas Supply Co.**, Los Angeles.
  Project: 128 miles of 34-in. from Topock, Ariz., to Newberry, Calif.
  Status: California Public Utilities Commission has granted certificate contingent upon FPC approval of Transwestern Pipeline Co.'s proposed project terminating at Topock, Ariz.
  Completion: November 1, 1959.
- **Pennsylvania Gas Co.**, Warren, Pa.
  Project: 23 miles of 10-in. in Erie Co., Pa., 15 miles of 8-in. in Warren and Chautauqua counties, Pa.; 30 miles of branch lines, and several small distribution lines.
  Status: Approved.
- **Peoples Natural Gas Co.**, Pittsburgh.
  Project: 30 miles of 20-in. from Bentleyville to Imperial, Pa.
  Status: Planned.
  Completion: September 1, 1959.
  Project: 25 miles of 24-in. from Waynesburg, Pa., to W. Va. line near Garrison, Pa.
  Status: Planned.
  Completion: September 1, 1959.
  Project: 14 miles of 12-in. from Johnstown to Seven Springs, Pa.
  Status: Planned.
  Completion: September 1, 1959.
- **Permian Basin Pipeline Co.**, Omaha, Neb.
  Project: 65 miles of 16-in. from Hobbs, N. M., to Kermit, Tex.
  Status: Under way.
  Contractor: **R. H. Fulton & Co.**, Lubbock, Tex., has main line construction; **Pipecote Service Corp.**, Tulsa, has internal coating contract.
- **Piedmont Gas Co.**, Hickory, N. C.
  Project: 78 miles of 2 to 8-in. extension off Transcontinental in N. C., to serve Gaston, Lincoln, Catawba, Caldwell, and Burke counties.
  Status: Approved.
- **Pioneer Natural Gas Co.**, Amarillo Tex.
  Project: 21 miles of 12-in. from Sudan to Muleshoe, Tex.
  Status: Pending FPC approval.
  Completion: March 1, 1959.
  Project: 12 miles of 10-in. from Muleshoe, Tex., northward.
  Status: Pending FPC approval.
  Completion: March 1, 1959.
- **Rio Gas Gathering Co.**, San Antonio, Tex.

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THE HAGUE
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The Hague, Holland

PIPE LINE TECHNOLOGISTS, INC.

Professional Pipe Line Engineers

PIPELINE CONSTRUCTION

Project: 97 miles of 3 to 8-in. gathering line in Hidalgo County, Tex.
Status: Pending FPC approval.
Completion: 1959.

- **Signal Oil & Gas Co.,** Los Angeles.

Project: Extension of gathering system from Tioga, N. D., to near the Canadian border in Burke Co.
Status: Being considered.

- **Southern California Gas Co.** and **Southern Counties Gas Co.,** Los Angeles.

Project: 206 miles of 34-in. from Ivanpah Lake to Placentia, Calif.
Status: Planned.
Completion: December 1959.

- **Southern Counties Gas Co.,** Los Angeles.

Project: 13.5 miles of 30-in. from Santa Ana to Huntington Beach power plant.
Status: Under way.
Contractor: **Pacific Pipeline Co.,** Los Angeles.
Completion: May 1, 1959.

- **Southern Natural Gas Co.,** Birmingham, Ala.

Project: Supply lines in S. La.: 6 miles of 6-in. South Lake Long field lateral; 13 miles of 16-in. Barataria Line loop; 2 miles of 12-in. Coffee Bay field lateral.
Status: Pending FPC approval.
Completion: 1959.
Project: 79 miles of 16-in. from Ocmulgee to Wrens, Ga.; 22 miles of 14-in. from Griffin to Atlanta, Ga.
Status: Pending FPC approval.
Project: 80 miles of 18-in. between Cranfield and Gwinville, Miss.
Status: Pending FPC approval.
Completion: 1959.
Project: 11 miles of 24-in., Gwinville-Enterprise, Miss.; 9 miles of 24-in., Enterprise, Miss.-Gallion, Ala.; 26 miles of 24-in., Gallion-Elmore, Al.; 43 miles of 20-in., Elmore, Ala.-Ellerslie, Ga.; 23 miles of 20-in., Ellerslie-Ocmulgee, Ga.; 17 miles of 20-in., Olga-Toca, La.; 35 miles of 16-in., Montegut-Gloria, La.
Status: Pending FPC approval.
Completion: 1959.

- **Southern Union Gas Co.** and **Southern Union Gathering Co.,** Dallas.

Project: 7 miles of 8-in., 4 miles of 10-in., 6 miles of 12-in. from Albuquerque, N. M., to Tijeras Canyon east of Albuquerque.
Status: Planned.
Completion: April 30, 1959.
Project: 11 miles of 8-in. from Atoka Penn field to Artesia Junction, N. M.
Status: Planned.
Completion: June 30, 1959.

- **South Georgia Natural Gas Co.,** Thomasville, Ga.

Project: Lines in Ga.: 2 miles of 2-in. near Meigs; 31 miles of 3-in. near Nashville; 41 miles of 4-in. and 39 miles of 6-in. near Tifton.
Status: Planned.
Completion: Summer 1959.

- **South Texas Natural Gas Gathering Co.** (Coastal States Gas Producing Co., Corpus Christi, Tex.)

Project: 57 miles of 20-in., 9 miles of 16-in., 21 miles of 14-in., 17 miles of 10-in., and 2 miles of 8-in., from Falfurrias to McAllen, Tex.
Status: Under way.
Contractor: **O. R. Burden Construction Corp.,** Tulsa.
Completion: Summer 1959.

- **Tennessee Gas Transmission Co.,** Houston.

Project: 21 miles of 16-in. and 2 miles of 12-in. to offshore La. fields.
Project: 158 miles of 36-in. loop in La. and Miss.
Status: Approved.
Completion: Planned for 1959.

- **Tensas Gas Gathering Corp.**

Project: 37 miles of 2 to 8-in. from Rodney field, Miss., westerly to connect with Olin Gas Transmission Co.'s line in Tensas Parish, La.
Status: Approved.

- **Texas Eastern Transmission Corp.,** Shreveport, La.

Project: 13 miles of 30-in. from Grennup Co., Ky., to Scioto Co., Ohio; 16 miles of 30-in. from Noble Co. to Monroe Co., Ohio.
Status: Pending FPC approval.
Completion: 1959.
Project: 13 miles of 30-in. in Bucks Co., Pa.; 81 miles of 24-in. from Leidy Storage field to Perulack Station, Pa.; 66 miles of 30-in. from Delmont, Pa., to Lambertville, N. Y.; 23 miles of 20-in. from Station 25 to Chester Junction, Pa.
Status: Pending FPC approval.
Completion: 1959.
Project: 40 miles of 36-in. from Station 26 to Station 27 in N. J., and 4 miles of 30-in. from Station 27, N. J., to Staten Island, N. Y.
Status: Pending FPC approval.
Completion: 1959.

- **Texas Gas Transmission Corp.,** Owensboro, Ky.

Project: 30-in. looping program: 50 miles near Alexandria, La.; 24 miles near Bastrop, La.; 9 miles near Greenville, Miss., 9 miles near Clarksdale, Miss.
Status: Approved. Under way.
Completion: 1959.
Contractor: **Houston Contracting Co.,** Houston, has completed 30 miles in vicinity of Pineville and Bastrop, La.
Project: 26-in. looping program: 9 miles

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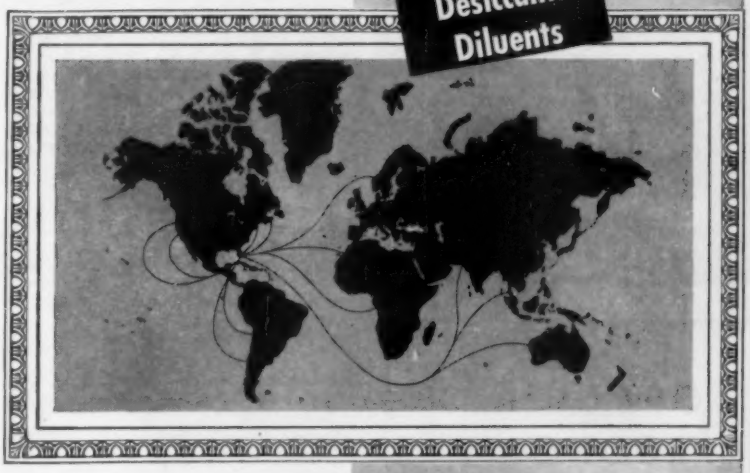

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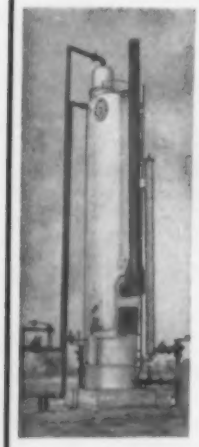

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PIPELINE CONSTRUCTION

near Hardinsburg, Ky.; 10 miles near Louisville, Ky.
Status: Approved.
Completion: 1959.
Project: 8 miles of 10-in. near Petersburg, Ind.; 5 miles of 16-in. near Dixie, Ky.; 2 miles of 6-in. near Linton, Ind.; 1 mile of 6-in. near Lawrenceville, Ill.
Status: Approved.
Completion: 1959.

- **Texas Illinois Natural Gas Pipeline Co.,** Chicago.

Project: 860 miles of 30-in. looping of present system.
Status: Planned.
Completion: 1960-1961.

- **Transcontinental Gas Pipe Line Corp.,** Houston.

Project: 57 miles of 30-in. main line loop in various states; 51 miles of 36-in. main line loop in various states; 219 miles of 36-in. main line loop in various states; 17 miles of 20-in. lateral; 52 miles of 10, 14-in. laterals in Tex. and La.; 51 miles of 24-in. and under in Tex. and La.
Status: 51 miles of 36-in. is approved and under way; 57 miles of 30-in. is deferred and planned; remainder is planned, pending FPC approval.
Contractor: **Sharman, Allen, Gay & Taylor, Inc.,** Houston; **H. C. Price Co.,** Bartlesville, Okla.; **Hallmac Construction Co.,** Houston; **Bechtel Corp.,** San Francisco; **J. P. Neill & Co., Inc.,** Dallas; **Panama-Williams Corp.,** Houston; **Brown & Root, Inc.,** Houston.
Completion: 1959.

- **Transwestern Pipe Line Co.** (Warren Petroleum, Monterey Oil Co., J. R. Butler), Dallas.

Project: 635 miles of 24-in. from Perryton and Fort Stockton, Tex., to Roswell, N. M., and 670 miles of 30-in. from Roswell to Topock, Ariz.
Status: Pending FPC approval.
Completion: Mid-1959.

- **Trunkline Gas Co.,** Houston.

Project: 45 miles of 24-in. from Moss Hill to Silsbee, Tex.
Status: Planned. Pending FPC approval.
Completion: May 1959.
Project: 115 miles of 30-in. from Pitkin to Riverton, La.
Status: Planned. Pending FPC approval.
Completion: July 1959.
Project: 119 miles of 30-in. from Kilborne, La., to Ballentine, Miss.
Status: Planned. Pending FPC approval.
Completion: September 1959.
Project: 117 miles of 30-in. from Canadaville, Tenn., to Bardwell, Ky.
Status: Planned. Pending FPC approval.
Completion: August 1959.
Project: 113 miles of 30-in. from Marion to Neoga, Ill.
Status: Planned. Pending FPC approval.
Completion: September 1959.
Project: 204 miles of 26-in. from Bourbon, Ill., to Vistula, Ind.
Status: Planned. Pending FPC approval.
Completion: August 1959.
Project: 45 miles of 14-in. and 32 miles of 4 to 10-in. from Hitchcock to Katy, Tex.
Status: Planned. Pending FPC approval.
Completion: June 1959.
Project: 33 miles of 20-in., 32 miles of 16-in., 9 miles of 6-in. from Lowry, La., to Block 26.
Status: Planned. Pending FPC approval.
Completion: May 1959.
Project: 34 miles of 12-in. from Lowry, La., to Block 67.
Status: Planned. Pending FPC approval.
Completion: July 1959.

- **United Gas Pipe Line Co.,** Shreveport.

Contractor: **Hallmac Construction Co.,** Houston.
Completion: March 24, 1959.
Project: 43 miles of 30-in. from Lake Pontchartrain to Kiln, Miss.
Status: Under way.

- **Valley Gas Transmission, Inc.** (Fish Engineering Corp.), Houston.

Project: 150 to 160 miles of 3 to 6-in. gathering lines to tap fields in Starr, Hidalgo, Brooks, and Jim Wells counties, Tex.
Status: Pending FPC approval.
Completion: 1959.

- **Western Slope Gas Co.** (Public Service Co. of Colorado), Denver.

Project: 2 miles of 8-in., 18 miles of 6-in., 13 miles of 4-in. extension of gathering facilities in Colorado.
Status: Planned.
Completion: 1959.

Canadian Crude Oil Pipelines

- **Act Oils, Ltd.**

Project: A 450-mile line from the Peace River region of northern B. C. to tidewater at Kitimat, B. C.
Status: Pending British Columbia Government approval.

- **B-A Alberta Pipe Line, Ltd.,** Calgary, Alta.

Project: 35 miles of 8-in. to connect Drumheller field, Alta., with existing lines running to Edmonton.
Status: Pending approval.

- **Bituminous Oil Pipeline Co.** (Royalite Oil Co., and Can-Amera Oilsands Development, Ltd.)

Project: A 250-mile line from Athabasca oil sands in northeastern Alta., to Edmonton.
Status: Proposed.
Completion: 1960.

- **Independent Pipe Line Co.** (Home Oil Co.), Calgary.

Project: 1,073 miles of 36-in. from Edmonton, Alta., to Superior, Wis.; 946 miles of 34-in. from Superior to Montreal, Que.; 72 miles of 16-in. and 74 miles of 10-in. feeder lines from Calgary to Bellshill Lake, Alta., on the 36-in. line.
Status: Proposed.

- **Mid-Continent Pipe Lines, Ltd.,** Edmonton, Alta.

Project: 1,500 miles of 30-in. from Edmonton to Chicago, via Sask., N. D., Minn., Wis., and Ill. U. S. section to be owned by International Oil Pipeline Corp., New York City.
Status: Pending Canadian Board of Transport Commission approval. **W. C. Gilman & Co.,** New York City, has made preliminary study.

- **Peace River Oil Pipe Line Co., Ltd.,** Calgary, Alta.

Project: 8 miles of 6-in., 45 miles of 8-in., and 17 miles of 12-in. from its Fox Creek Pump Station to Windfall, Virginia Hills, and Swan Hills fields in Alta.
Status: Approved.

Canadian Products Pipelines

- **Foothills Products Pipe Line, Ltd.** (Pembina Pipe Line Co., Mannix Co., Ltd.), Calgary, Alta.

Project: Gathering system to connect Alta. gasoline plants to trunk line from Alta. to Pacific Coast.
Status: Proposed.

- **Hydrocarbons Pipeline Co.,** Winnipeg, Man.

Project: 800 miles of 6, 8-in. LPG line from near Edmonton to Fort William, Ont.
Status: Has Parliament of Canada approval. Seeking approval of Federal Board of Transport Commissioners and the Alberta Petroleum and Natural Gas Conservation Board.

PIPELINE CONSTRUCTION

Contractor: **Dutton - Williams Brothers, Ltd.,** Calgary, and **A. D. Little Co.,** Boston, are consultants.

- **Pembina Pipe Line, Ltd.,** Edmonton, Alta.

Project: A 1,200-mile line to carry sulfur, LPG, and natural gasoline from Alta.'s gas fields to eastern Canada.

Status: Proposed.

Canadian Natural Gas Pipelines

- **Alberta Gas Trunk Line Co., Ltd.,** Calgary.

Project: 122 miles of 30-in. from Princess to Torrington, Alta.; 122 miles of 6 to 16-in. at various locations.

Status: Planned.

Completion: October 1959.

Project: 256 miles of 36-in., 75 miles of 30-in., 55 miles of 26-in., 199 miles of various diameter gathering lines, and 42 miles of 16-in. delivery lateral.

Status: Pending approval of Canadian and U. S. regulatory agencies. To start late 1959.

- **Alberta Natural Gas Co., Ltd.** (Pacific Gas & Electric Co., San Francisco, and **Westcoast Transmission,** Calgary).

Project: 108 miles of 36-in. across southeastern British Columbia to U. S. border near Kingsgate, B. C.

Status: Pending approval of Canadian and U. S. regulatory agencies. To start late 1959.

- **Cartier Gas Corp.** (St. Maurice Gas, Inc., and Consumers' Gas Co., Toronto).

Project: 170 miles from Montreal to Quebec City.

Status: Proposed.

- **Northern Natural Gas Co.,** Omaha.

Project: 73 miles of 20-in. from Savanna Creek to Pincher Creek, Alta.

Status: Planned.

Project: 32 miles of 24-in. from Pincher Creek to Mont. border to tie in with planned U. S. line on to Minneapolis.

Status: Planned.

- **Saskatchewan Power Corp.,** Regina, Sask.

Project: 267 miles of transmission lines.

Status: Planned.

Completion: 1959.

- **Trans-Canada Pipe Lines, Ltd.,** Toronto.

Project: 500 miles of main-line loops.

Status: Planned.

Completion: Late 1962.

- **Van Tor Oil & Exploration Co.,** Vancouver, B. C.

Project: Line from B. C. mainland to Vancouver Island.

Status: Proposed.

Completion: 1960.

- **Westcoast Transmission Co., Ltd.,** Calgary.

Project: (See Alberta Natural Gas Co., Ltd., for joint project).

Foreign Crude Oil Pipelines

- **Arabian American Oil Co.,** Dhahran, Saudi Arabia and N.Y.C.

Project: 63 miles of 30, 32-in. from Khursaniyah to Ras Tanura.

Status: Planned.

Contractor: Company personnel.

Completion: January 1, 1960.

Project: 18 miles of 34, 36-in. from Qatif to Ras Tanura.

Status: Planned.

Contractor: Company personnel.

Completion: July 1, 1962.

Project: 6 miles of 30-in. from Ras Tanura to Ras Tanura terminal; 4 miles of 14-in. from Buqqa to QA-2 pipeline.

Status: Planned.

Contractor: Company personnel.

Completion: October 1, 1960.

- **Assam Oil Co.,** Digboi, Lakhimpur District, Assam, India.

Project: 600 miles of 20-in. from Nahorkatiya field in Upper Assam to Barauni, India, to connect with Burmah Oil Co.'s proposed 250-mile line from Barauni to Calcutta.

Status: Survey of possible routes under way.

Contractor: **Pipe Line Engineering Co.,** Dallas, is making survey.

- **Basrah Petroleum Co.**

Project: Two 32-in. submarine lines from Fao, Iraq, to island 24.3 miles out in Persian Gulf.

Status: Under way.

Contractor: **Collins Submarine Pipelines Overseas, Ltd.,** Port Lavaca, Tex.

Completion: Summer 1959.

- **Bolivia-Paraguay.**

Project: 500 miles of 6-in. from Southeast Bolivia to a proposed refinery on Paraguay River, and later to Asuncion.

Status: Planned.

- **British Petroleum, Ltd.**

Project: 60 miles of 18-in. across South Wales, from Milford Haven to the Llandarcy refinery.

Status: Under way.

Completion: Late 1959.

- **Burmah Oil Co., Ltd.,** Glasgow, Scotland.

Project: 250 miles of 20-in. from Barauni to Calcutta, India, extending Assam Oil Co.'s proposed line.

Status: Survey under way.

- **Colombian Petroleum Co.**

Project: 42 miles of 6-in from Tibu field to Rio de Oro in Colombia, S. A.

Status: Under way.

- **C.R.E.P.S., Societe Nationale de Recherche et d'Exploration des Petroles en Algerie (SN Repal)** and **Cie. Francaise des Petroles Algerie,** Paris, France.

Project: 470 miles of 24-in. from Edjele fields in southeastern Algeria to the Tunisian Mediterranean coast.

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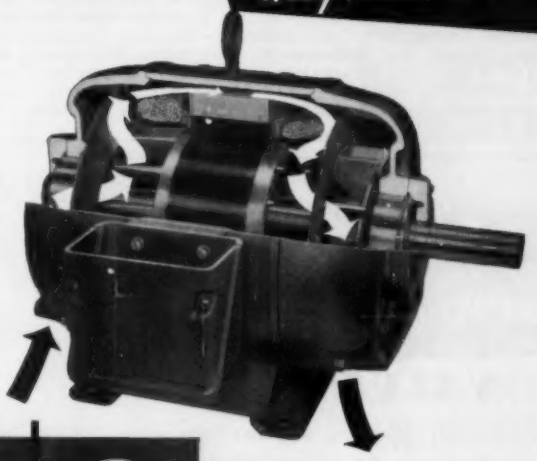

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Status: Preliminary work under way. Pipe laying to start in 1959.

Contractor: **TRAPSA** (transportation subsidiary of CREPS), with technical assistance and supervision of the project by **Bechtel Mediterranean** (subsidiary of Bechtel Corp., San Francisco).

Completion: September 1960.

- **Elburz Oil Corp.**

Project: 1,000 miles of 38-in. to move Qum crude to the Mediterranean.

Status: Planned.

- **ENI (Italian state oil agency)** and **Italo-Swiss Finance Co.**

Project: 250-miles of 24-in. and smaller diameters from Genoa to Aigle, Switzerland.

Status: Planned.

Completion: 1961.

- **Iranian Oil Exploration & Producing Co.**

Project: 26 miles of 30-in. from Ganaweh, Iran, to Kharg Island.

Status: Under way.

Contractor: **International Marine Constructors, C. A.,** Port Lavaca, Tex.

Completion: Summer 1959.

- **Iranian Oil Participants, Ltd.**

Project: 30 miles of 20-in. and 22 miles of 16-in. looping of Agha Jari to Bandar Mashur line.

Status: Planned.

Project: 50 miles of 26, 28-in. from Gach Saran field to new terminal at Kharg Island in the Persian Gulf.

Status: Under way.

Contractor: A joint venture of **Raymond Concrete Pile Co.** and **Williams Bros. Co.,** Tulsa, **Richard Costain, Ltd.,** and **John Brown, Ltd.,** London, and **Werkspoor & Bredoro,** The Netherlands.

- **Iraq Petroleum Co.,** London.

Project: 600 miles of up to 40-in. from Kirkuk field through Iraq to Turkish port of Iskenderun on the Mediterranean.

Status: Proposed. Survey completed.

- **Kuwait Oil Co., Ltd.,** London.

Project: 61 miles of 30-in. from Raudhatain area to Ahmadi.

Status: Under way.

Completion: June 1959.

Project: 5 miles No. 11 and 5 miles No. 12 gravity line from Ahmadi North Tank Farm to North Pier; 4 miles of 34-in. from Ahmadi South to Ahmadi North Tank Farm; 6 miles of 38-in. loading lines on North Pier.

Status: Under way.

Completion: First quarter 1959.

- **Mene Grande Oil Co.,** Caracas, Venezuela.

Project: 24 miles of 16-in. from Zarza to Zulus; 12 miles of 24-in. from West Guara to Oficina; 5 miles of 24-in. near Melones.

Status: Planned.

Completion: 1959.

- **Middle East Pipeline.**

Project: 1,500 miles of 38, 40-in. from Persian Gulf to Mediterranean at Iskenderun, Turkey.

- **Petroleo Brasileiro S. A. (Brazil).**

Project: 40 miles of 12-in. from Catu to Madre de Deus in Bahia.

Status: Under way.

Contractor: **Techint, Inc.**

Project: 80 miles of 24-in. to tie in to proposed Caxias refinery near Rio de Janeiro.

Status: Planned.

- **Rotterdam-Rhine Pipeline Co.** (Caltex Petroleum Maatschappij, Bataafsche Petroleum Maatschappij, Geisenberg Benzin A. G., and Moiloil A. G.)

Project: 39 miles of 30-in. and 96 miles of 24-in. from Rotterdam to Ruhr industrial area in West Germany to supply refineries at Godorf and Wesseling, and a 25-mile branch to Wessel to serve the refinery in Gelsenkuchen.

Status: Under way.

Contractor: **Bechtel International Co.** is managing the engineering and construction, W. C. Anthony, chief of construction operations, office at The Hague. German and Dutch contractors have 33 miles of 24-in. in south Holland, and 4 major submarine crossings.

Completion: Mid-1960.

- **Royal Dutch-Shell.**

Project: 700-mile line across Europe from the Mediterranean to the North Sea, running through eastern France, Luxembourg, West Germany, Netherlands, and Belgium. Main line to be 30-in.

Status: Considering project as joint venture with several other companies.

Project: 161 miles 20-in. line from Tandzung field to Balikpapan refinery, Borneo.

Status: Planned.

Contractor: **Williams Brothers Overseas, Ltd.,** Tulsa, and **John Brown, Ltd.,** London.

Completion: January 1, 1962.

- **SOPEG** (construction organization for Cie. Francaise des Petrole (Algerie) and Ste. Nationale de Recherche et d'Exploitation des Petroles en Algerie).

Project: 412 miles of 24-in. from Hassi Messaoud field in the Algerian Desert to Bougie on the Mediterranean Coast.

Status: Under way.

Contractor: **Entrepose Co.** and **Ste. Parisienne pour Industrie Electrique** have 281 miles. **SOCOMAN** and **Eau Assainissement** have 131 miles.

Completion: Late 1959.

- **South European Pipeline Co.** (Jersey Standard, Caltex, and 17 European firms).

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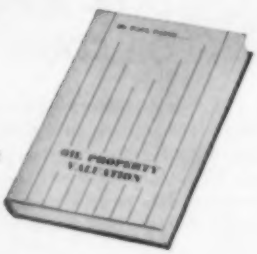

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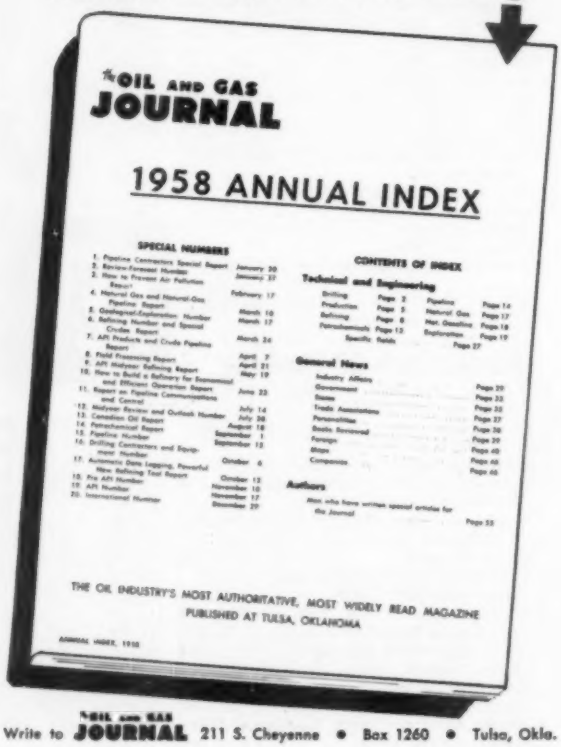

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PIPELINE CONSTRUCTION

Project: 932 miles of 30-in. from Marseilles, France, to Hamburg, Germany.
Status: Proposed.

- **Superior Oil Co.,** Los Angeles.

Project: A 16 and 24-in. line from its Lake Maracaibo, Venezuela, production to shore.
Status: Planned.
Contractor: **Pipe Line Technologists, C.A.,** Maracaibo, has design.

- **Union of Soviet Socialist Republic.**

Project: 2,315 miles of 28-in. Trans-Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Baikal.
Status: Under way.
Project: 600-mile line from Russian fields to Czechoslovakia.
Status: Planned for 1960.
Project: Line from Russian fields to East Germany, possibly as part of a petrochemical expansion program.
Status: Planned.

- **Yacimientos Petroliferos Fiscales (Argentina),** Buenos Aires.

Project: 815 miles of 12-in. from Campo Duran to San Lorenzo.
Status: Under way.
Contractor: **SARGO** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.).
Completion: Mid-1960.
Project: 390 miles of 14-in. from fields in Neuquen Province, Argentina, to Bahia Blanca on the coast.
Status: Bids requested.
Project: 625 miles of 12-in. from Mendoza to San Lorenzo.
Status: Planned.

Foreign Products Pipelines

- **Kuwait Oil Co., Ltd.,** London.

Project: 12 miles of 16, 20, 24-in. on Ahmadi North Pier.
Status: Under way.
Completion: First quarter 1959.

- **National Iranian Oil Co.,** Azna, Iran.

Project: 200 miles of 6 and 8-in. extension of the Trans-Iranian line from Teheran northward to Resht on the Caspian Sea.
Status: Under way.
Contractor: **B. & M. Construction Co.,** Oklahoma City; **Cheney Construction Co.,** Seattle; **Merritt-Chapman & Scott,** New York City.
Completion: April 1959.

- **Union of Soviet Socialist Republic.**

Project: 2,315 miles of 28-in. Trans-Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Baikal.
Status: Under way.

- **Yacimientos Petroliferos Fiscales (Argentina),** Buenos Aires.

Project: 652 miles of 10-in. from Lujan de Cuyo to Buenos Aires.
Status: Planned.

Foreign Natural Gas Pipelines

- **Attock Oil Co., Ltd.,** London.

Project: 60 miles of line from Dhulian field to Rawalpindi in West Pakistan.
Status: Planned.

- **Cuban Gas Transmission Co.**

Project: 500-mile line from Campeche area of Mexico across Yucatan and a 150-mile line on the ocean floor to Havana.
Status: Under study by **Ebasco Services.**

- **Gaz de France.**

Project: 550 miles of 16 to 24-in. from Lacq field in southwestern France to Paris, plus 12 to 16-in. laterals to Lyons, making a 1,000-mile system.
Status: Under way.
Contractor: French contractors.
Completion: Line to Lyons to be completed March 1959; line to Paris in 1960.

- **Japan Gas Chemical Industries.**

Project: 10 miles of 10-in. from its company-owned fields to plants in Niigata, Japan.
Status: Under way.
Completion: Spring 1959.

- **Mene Grande Oil Co.,** Caracas, Venezuela.

Project: 20 miles of 12-in. from Soto to Mata.
Status: Planned.
Completion: 1959.

- **Petroleos Mexicanos,** Mexico D. F.

Project: 130 miles of 22-in. to parallel a 14-in. line from Reynosa to Monterrey.
Project: 490 miles of 24-in. from Jose Colomo field in the State of Tabasco to Mexico City.
Status: Preliminary work under way.
Completion: March 1960.

- **Sui Gas Transmission Co.,** Multan, Punjab, India.

Project: 130-mile extension of the new 310-mile, 16-in. Multan-to-Sui, Pakistan line. Extension will terminate at Lyallpur.
Status: Planned.

- **Union of Soviet Socialist Republic.**

Project: A 465-mile line from Karadag near Baku to Tbilisi and Erevan.
Status: Under way.
Completion: 1960.
Project: A 127-mile line across the Turkmenian Desert from Kizyl-Kum to the Caspian Sea port of Krasnovodsk.
Status: Under way.
Project: Two parallel lines, each over 1,200 miles long, from Gazly, near Bukhara, northward to Sverdlovsk and Chelyabinsk.
Status: Proposed.

- **Yacimientos Petroliferos Fiscales (Argentina),** Buenos Aires.

Project: 1,015 miles of 24-in. from Camp Duran to Buenos Aires.
Status: Under way.
Contractor: **SARGO** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.), subcontracted to COGAR (River Construction Corp., Ft. Worth, Tex.), Milton Brazier, supt. for 700 miles from Buenos Aires to Tucuman, office at Buenos Aires; E. L. "Tex" Maggard, supt. for 400 miles from Campo Duran to Tucuman.
Completion: August 1960.
Project: Line from Comodoro Rivadavia to Buenos Aires with a spur to Plaza Huincul field in Neuquen province. Line will be 26-in. to the connecting point for the Plaza Huincul link and 30-in. from the connection to Buenos Aires.

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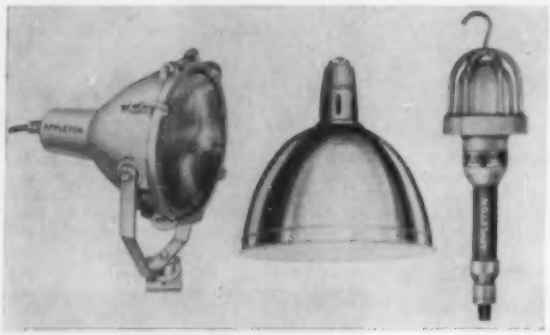
▶ ▶ ▶ New Equipment Section

This week's SHOWCASE features . . .



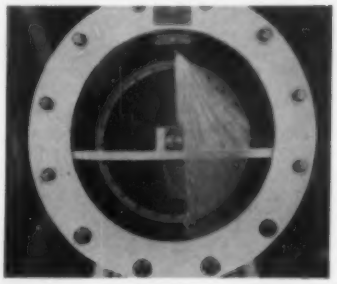
Fixtures supply light where needed

. . . in industrial plants. The Series 6050 floodlight (left) is made of aluminum and designed to give after-dark lighting where needed in "problem" areas. An adjustable dial mechanism gives wide range focus in any direction, allowing desired beam spreads. The free-swinging cover ring allows fast servicing. The weathertight floodlight can be used with Mogul base 300 or 500-watt incandescent lamps or mercury-vapor lamps.

The 24-in. vented high-bay mercury-vapor fixture meets the National Electrical Code Standard for 1,000-watt mercury vapor lamps. The hood is vented to keep operating temperature low. The fixture permits concentrated or spread type of lighting.

The Type EHL explosionproof handlamp is weather resistant, raintight, and designed to take rough service. Weighing only 4½ lb. and rated at 100 watts, it has a heat and impact-resistant globe protected by a cast-aluminum guard. All parts are of nonsparking materials. **Write or call: Appleton Electric Co. 1713 West Wellington Street, Chicago 13, for details on Series 6050 floodlight, 24-in high-bay fixture, or Type EHL handlamp.**

●



Pressure-leaf-filter jet

. . . offers fast cleaning. Compared with manual cleaning, it is not only faster but requires less labor and is cleaner. The spray jet is designed to give the needed force to remove tenacious materials.

The nozzle gives double-acting fan-shaped streams to clean the front of one leaf and the back of the other at the same time. It is equipped with a ring to confine the spray width and no increase the spray force.

In plant tests, three revolutions of the leaves were all that was needed to remove all but the most tenacious materials. **Write or call: Hercules Filter Corp., 218 Ethel Avenue, Hawthorne, N. J., for details on pressure-leaf-filter jet.**

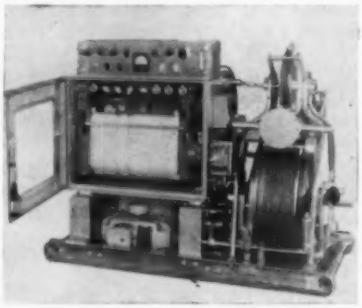
●

Sucker rod for slim-hole wells

. . . as well as two-zone and stripper-production wells is now obtainable in two sizes—½ and 1-in. o.d. Both 25-ft. and standard-length pony rods are available. The wrench square is ⅝ in. across the flats.

Large radii and fillets provide a gradual area change in the upset, to eliminate the possibility of premature failure common to radical changes in cross-sectional areas. **Write or call: Axelson Mfg. Co., 6109 South Boyle Avenue, Los Angeles 58, for details on sucker rods for slim holes.**

●



Loggers handle depths to 10,000 ft.

. . . and will obtain a variety of logs. The portable Series V logger is equipped for logging wells as deep as 5,000 ft. It can be obtained as Type PR for potential and single-electrode resistivity curves or as Type PR2N for potential, single-electrode resistivity, and long and short normal-resisitivity curves.

The Series Z logger is a heavier,

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to the Manufacturer of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER.....

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Described in OIL AND GAS JOURNAL - Issue of Feb. 23, 1959

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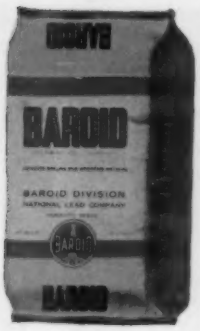
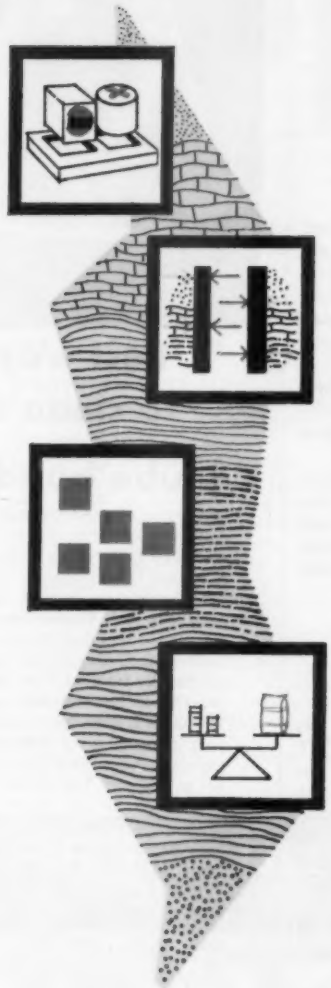
Seeing Is Believing . . .

MUD WEIGHTING MATERIALS MAY LOOK ALIKE . . . BUT TESTS SHOW



BAROID* PERFORMS BETTER



All barium sulfate mud weighting materials look and weigh about the same, but they perform differently. Each mud company sets its own standards of quality. BAROID meets the highest standards.

These differences in standards can mean added expense to control the three basic properties of drilling mud: weight, filtration and flow properties.

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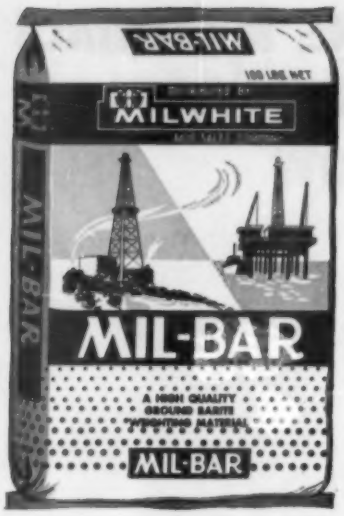

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nonportable unit for logging wells to depths of 10,000 ft. Electric logs consist of potential, one lateral, and two normal resistivity curves.

Optional for the loggers are gamma-ray, temperature, and caliper logging attachments. Both instruments are designed to be operated by an exploration company's personnel. **Write or call: Well Instrument Developing Co., P. O. Box 282, Bellaire, Tex., for details on Series V and Z loggers.**

●

Hydraulic tubing tong works quickly

. . . and smoothly. The maker has used unit construction of the valve and motor to eliminate cumbersome piping, hoses, and fittings. Jaw sizes can be changed quickly. A six-contact-point jaw design gives a tight gripping action.

The maker reports that the tong will not crush API tubing. And it minimizes diecutting or gouging of new high-strength tubing.

The hydraulic motor is a gear type. The case is streamlined, and the handles are easy to grip. **Write or call: Hillman-Kelley, 1000 Macy Street, Los Angeles 33, for details on Hydraulic tubing tong.**

●

Instrument tests refinery effluent

. . . for oil and phenol content by means of API methods 733 and 717. The Model 2834 analyzer was developed specifically for use in refineries by nontechnical personnel.

Ruggedly built yet portable, the instrument is easily operated. It uses a selected grating. Narrow bands are obtained by fixed slits yielding an 8 mμ bandwidth. Wavelengths are accurately adjusted at 2.82 and 3.43 μ for analysis of phenols and oils.

Power requirement for the instrument is 100 to 120-volt a.c. and 140 watts. **Write or call: Axler Associates, Inc., 102 Forty-Third Avenue, Corona 68, L. I., N. Y., for details on Model 2834 instrument.**

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tube bundle

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FLEXIBLE Compactness and precision control combine to offer a new standard in versatility. ELECTROFINING Equipment can be placed at the delivery end of a pipeline or at the starting end. It can be installed at an airport or on an aircraft carrier as well as in a refinery.

ECONOMICAL The cost of ELECTROFINING Precipitation Equipment is many times less than that of treating methods incapable of delivering comparable results. And, compared to the expense and hazards of contaminated products, or the nuisances of air and stream pollution, its cost is negligible.

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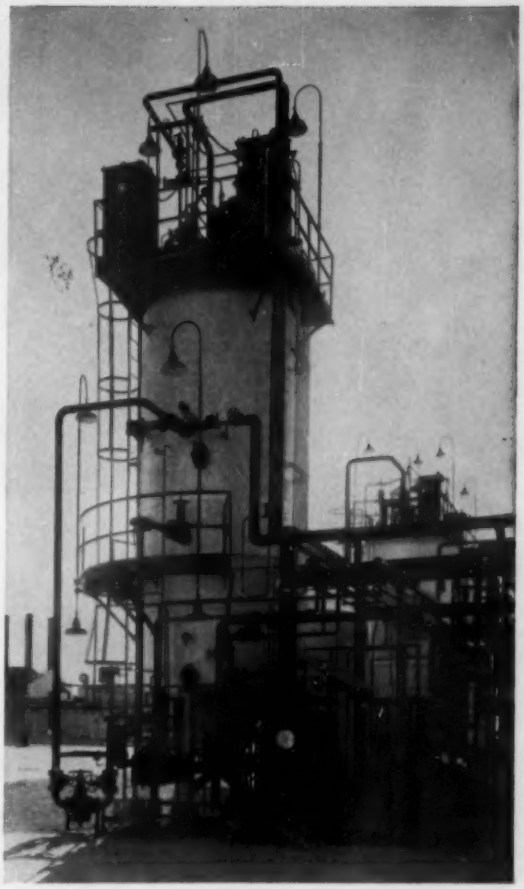

▶ *See our exhibit at the International Petroleum Exposition, May 14-23 and 5th World Petroleum Congress, June 1-5.*

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Putting the Laurel to bed

That's The Laurel Pipe Line! *Recently completed, this 440-mile line is the first to use 24-inch-diameter pipe in a major cross-country refined products system.*

Gasoline and other petroleum products will be transported through the line from Delaware River Valley refining centers to inland marketing areas such as Reading, Harrisburg, Pittsburgh and Cleveland.

National Tube supplied the pipe for the Laurel Line—approximately 66,000 tons of USS National Seamless and Electric Weld Line Pipe in sizes 24" O.D. to 14" O.D. for the main line and 9,000 tons for feeder lines, take-offs, and terminal facilities.

The eastern section of the main line, some 135 miles, is 24" diameter, API 5L X-52 pipe, ranging from .281 to .375-inch wall thickness. Initially, the line's throughput is expected to be about 100,000 barrels a day; however, this can be increased to 300,000 barrels with additional pumping stations. This line will make a greater variety of refined products available, in increased quantities, at a considerably lower transportation cost.

The Laurel Pipe Line represents another first for USS National Line Pipe. Why is USS National consistently chosen for rugged line pipe assignments? The answer in a word: *Performance.* You see, National Line Pipe combines the qualities of strength and dependability to give you a better product. Remember, too, that National Line Pipe is available in a complete range of wall thicknesses, steel analyses and in diameters up to 26 inches in Seamless and up to 36 inches in Electric Weld. For more information, write to National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

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to improved performance– greater economy– with these pipeline specialties

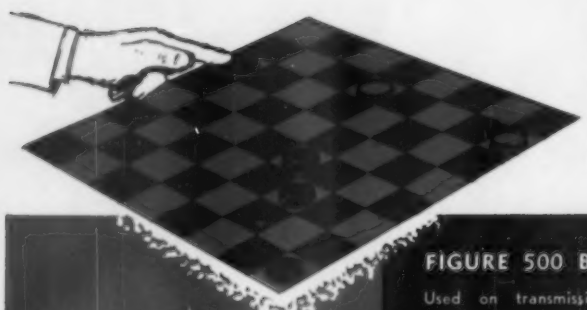

FIGURE 500

FIGURE 500 BLANK CAP

Used on transmission systems the world over for scraper traps, strainers, blowdowns and other installations requiring a "blanking" end. All sizes to 38", in ASA Series 150 through 1500, with or without hinges. Features O-Ring seal, 2-piece design.

FIGURE 505

FIGURE 303 MIS-ALIGNING UNION

Provides for 7½° mis-alignment in any direction without losing pressure seal. Mating parts move on arcs of a common circle to give smoothest mis-aligning movement. Ideal for use where temperature extremes cause expansion and contraction. Sizes to 8", for working pressures to 5000 psi.

FIGURE 303

FIGURE 505 WELDING UNION

Fills all requirements of the transmission industry for a "quick" connection. O-Ring provides positive seal against gas, liquids or vapors, pressure or vacuum. Withstands temperatures to 400° F. All sizes to 24", in ASA Series 600.

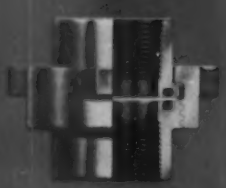

FIGURE 110

FIGURE 110 INSULATED UNION

Prevents electrolytic corrosion by breaking the flow of current. Non-conductor gasket has tremendous compressive strength — is resistant to all common acids, oil and gas. Double O-Rings assure positive seal. All sizes to 16", for working pressures to 10,000 psi.

FIGURE 400

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Slim LaGrone Co.—Odessa, Texas
Bob Hawk Eqpt. Co.—Hobbs, N. M.
Brailes & Cope—Wichita Falls, Texas
A. S. (Andy) Herron—Lake Charles, La.
C. B. Blair—Shreveport, La.
Louis Ray—Farmington, N. M.
Rocky Mtn. Spec. Co.—Casper, Wyo.

Howard Crider—Oklahoma City, Okla.
L. P. Kinnear—Great Bend, Kansas
Lee Snodgrass Co.—South Gate, Cal.
Neil Ginther—Wooster, Ohio
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FIGURE 400 CHOKE UNION

Regulates downstream pressure or volume through use of interchangeable orifice plates. Serves also as conventional union when full opening plate is used. All sizes to 4", for working pressures to 3000 psi.

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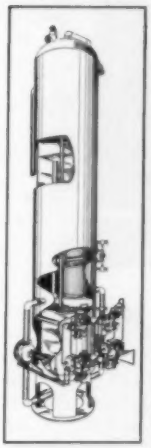
Business plane lands on short strip

. . . of less than 500 ft. over a 50-ft. barrier with zero wind. The Helio Super Courier is expected to be valuable in oil-industry operations where runway space is limited.

Powered by a 295-hp. engine, it cruises at 170 m.p.h. yet can fly as slowly as 30 m.p.h. The five-place plane can carry up to 1,900 lbs. Designed for short takeoff and landing, it has a range of over 700 miles with a fuel capacity of 60 gal. Two large doors on the left front and right rear provide convenience for handling of bulky cargo. **Write or call: Helio Aircraft Corp., 230 Park Avenue, New York 17, for details on STOL Super Courier.**

Metering free-water knockout



. . . uses an interface control to eliminate the need for a water leg and to increase metering efficiency. The interface control is combined with a throttling three-way, three-position valve to maintain a constant interface level—even with varying liquid specific gravity.

Installation and maintenance are made simple through the use of bolted couplings for the connections. The unit measures and records the amount of oil, gas, and water passing through it. It can be used independently on a single lease, or it can be integrated into a completely remote-controlled field-automation system. **Write or call: Odex Engineering Co., 1410 North Grant, Odessa, Tex., for details on vertical metering free-water knockout.**

•

Torque-converter driven loaders

. . . can be obtained with capacities of 9,000 and 3,000 lb., respectively. The four-wheel-drive Model H-90 Payloader with a capacity of 9,000 lb. has a low-profile front shroud which gives the operator improved visibility and allows easier and safer operation as compared to the older Model HO loader which it replaces.

The H-90 has a breakout force of 21,000 lb. and a bucket tipback of 44° at ground level. Either a gas or a diesel engine is available to power the machine. Buckets are available in sizes from 1½ to 5 cu. yd.

The rear-wheel-drive Model H-30R

"SCOT" FORGED SEAMLESS RING GASKETS

MINIMUM HARDNESS

For ring Groove Flanges forged from reforging billets in the following materials in stock: Soft Steel, Copper, Aluminum, Inconel, Monel, Nickel; 1¼ Cr ½ Mo., 2¼ Cr 1 Mo., 9 Cr 1 Mo. 304, 310, 316, 321, 347, 405, 410, 430, 502.

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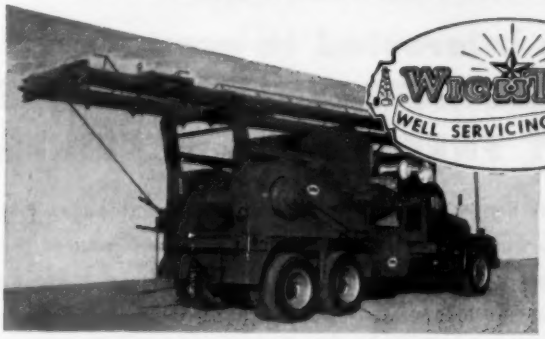

2,000' to 12,000' capacity—spudding attachment optional

Why the popularity of Wichtex Well Servicing Units? These units enable the contractor to provide fast efficient service on every job . . . and keep costs to an absolute minimum! Compare performance, quality, and price! Wichtex units are the world's BEST BUY in servicing units!

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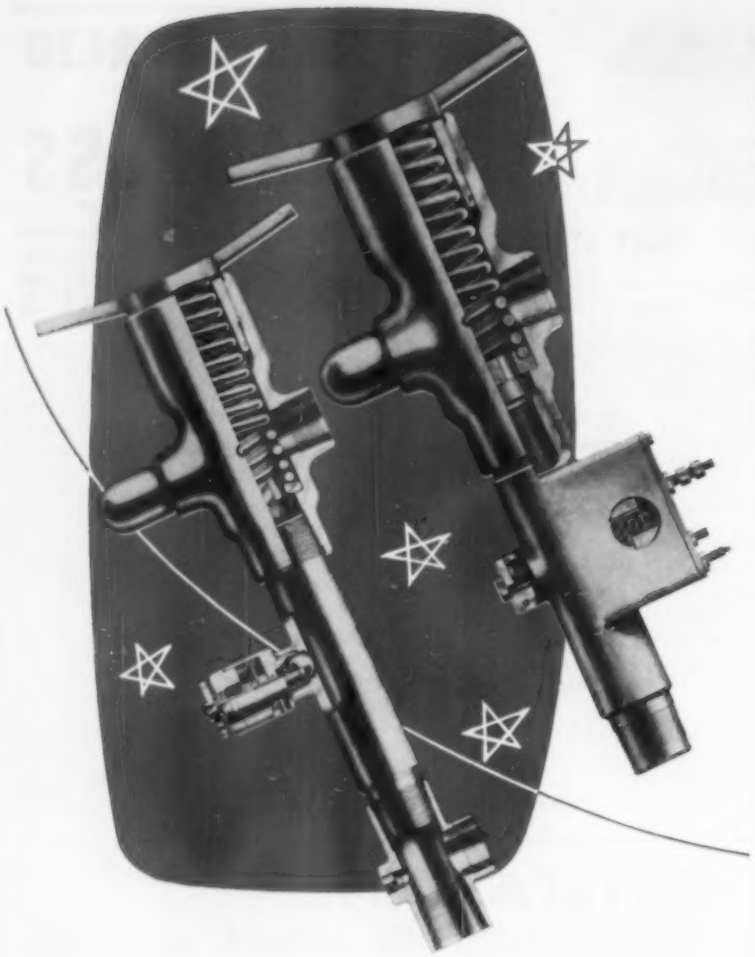

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YOU'LL BE INTERESTED IN THESE GARRETT FREE PISTON RECEIVERS

All new from top to bottom, Garrett Free Piston Receivers offer economy, flexibility, convenience and safety. Interchangeable components permit low cost conversion from one type to another. Double-seal top connection —4" line pipe thread plus O-Ring— assures a perfect seal and permits installation of lubricator without breaking other threads. Pistons quickly and easily removed for inspection. Stainless steel and Monel throughout; manual or automatic catcher; Magnetic Trip optional. These receivers accommodate any type of Garrett Free Piston, and may be used with Garrett or other operating procedures.

For the full story on the new Garrett Receivers and Free Pistons, write for Bulletin No. 159 PC or ask your Garrett representative. Piston sizes, 1¼" to 2½", in four types adaptable to all well conditions.

USI **Garrett Oil Tools**
Division U. S. Industries, Inc.
P. O. BOX 2427 • LONGVIEW, TEXAS

SHOWCASE . . .

New Equipment

Payloader with a capacity of 3,000 lb. is available with buckets in sizes of ⅔ to 2 cu. yd. It has a bucket tip-back of 40° which enables an operator to obtain larger loads than was possible with the older Model HF loader which it replaces. **Write or call: Frank G. Hough Co., 971 Seventh Street, Libertyville, Ill., for details on Models H-90 and H-30R loaders.**

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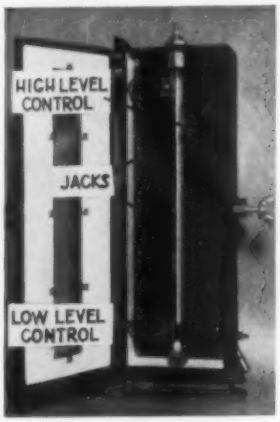


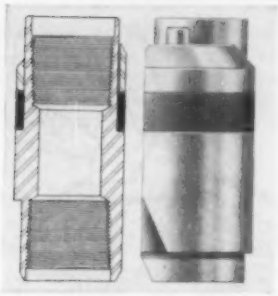
Automatic liquid-level controller

. . . is designed to regulate both high and low levels in a tank. It is expected to prove particularly well-suited for lease automatic custody transfer units.

Called a Phil-mag, the instrument can be installed on a surge tank to shut in a system when the tank is on its low limit or to divert a stream to another vessel when a tank is full.

The liquid-level setting is changed by moving reed switches on the outside of the instrument up or down. The unit is easy to install, and cutting of the tank wall is unnecessary to install float switches. All switches have pin plugs to eliminate the need for field soldering. An adequate number of jacks are spaced on the instrument for various liquid levels.

The instrument gives a direct reading in feet and inches for a given specific gravity of liquid. No calibration curves are necessary. It is equipped for API fluid gravities from 35° to 60°, in 5° increments. Through a plastic window on the instrument, visual readings can be easily taken. **Write or call: Enardo Mfg. Co., P. O. Box 1647, Tulsa, for details on Philmag liquid-level control.**



Tubing hanger for dual strings

. . . allows independent lowering or raising of either string of tubing. The DX-2521 hanger provides a full area opening for tool passage.

The hanger consists of a lower segment with tubing suspension threads on the lower end and tubing-handling threads on the upper end. The upper end of the hanger has a recess that is larger than the standard counterbore to receive a seal nipple for isolation of the tubing string.

One hanger of each pair is provided with a seat area lower than the other and with two beveled guide areas, one on either side, to properly locate the hanger in the tubing head. **Write or call: Alco Products, Inc., P. O. Box 512, Beaumont, Tex., for details on DX-2521 Tubing Hanger.**

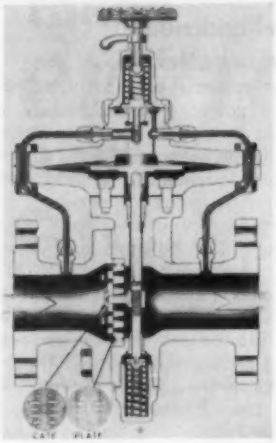
●

Rectifier converts 3,000 watts

. . . of a.c. power to direct current. The Di-rect-all unit is available in single phase and three-phase models. The units are compact and can be easily wall-mounted where direct current is required.

Suited for direct-current motors and other applications, the d.c. power supply contains no moving parts and is simple to install. All that is necessary is to connect the alternating-current input and the direct-current output. **Write or call: Good-All Electric Mfg. Co., Ogallala, Neb., for Bulletin P1-58.**

●



Piloted pressure regulator

. . . using a sliding gate and plate main valve is now obtainable in 2½ and 3-in. sizes for pressures to 250 psi. and temperatures to 460° F. The pilot-operated pressure-reducing valve has an integral pilot equipped with a filter screen, large passages, and a ball-bearing adjusting screw with handwheel.

The regulator is designed to give straight-through flow for low turbulence and accurate regulation. Self-lapping seats are used to give tight shutoff. The valve body is of cast iron and flanged. Connections are either 125 or 250-lb. ASA. **Write or call: OPW-Jordan, 6013 Wiehe Road, Cincinnati 13, for Bulletin JNP-1.**

●

Analog data multiplexer

. . . can be coupled to a voice-frequency telephone, radio, or microwave circuit to transmit seven channels of analog data over long distances.

From one to eight adjustable voltage-controlled FM subcarrier oscillators may be plugged into the Model 3515 multiplexer. In addition to the seven analog data channels, it will transmit a reference frequency channel and a full-duplex communications channel. **Write or call: Geotechnical Corp., P. O. Box 28277, Dallas 28, for details on Model 3515 multiplexer.**

This announcement is neither an offer to sell nor a solicitation of an offer to buy these securities. The offer is made only by the Prospectus.

2,900,000 Shares

Universal Oil Processes, Inc.

(Name to be changed to Universal Oil Products Company)

Capital Stock

(Par Value $1 Per Share)

Price $25 per Share

Copies of the Prospectus may be obtained in any State only from such of the several Underwriters, including the undersigned, as may lawfully offer the securities in such State.

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AC — dc

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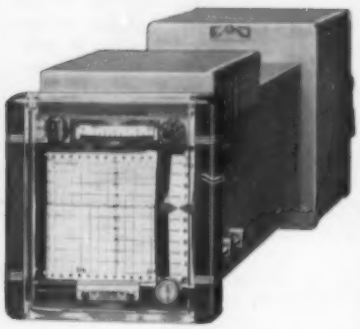

The past year has been revolutionary. Electronic process control has won universal acclaim on every consideration: simplified installation . . . reduced maintenance . . . and, most important, better control performance. The evidence was so conclusive that other systems were totally ruled out on many new installations.

Swartwout pioneered electronic process control so Swartwout had a definite advantage: it was free to select the ideal circuit. AC in the measuring circuit has given unmatched simplicity and reliability extending the lengths and heights of the processing plant. DC is rightly used for the actuator. Experience has borne out the wisdom of this selection.

Moreover, Swartwout has shown that this vastly better control can be furnished without increased cost over pneumatic systems.

Send for Bulletin Series A-801. The Swartwout Co., 18511 Euclid Avenue, Cleveland 12, Ohio.

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SHOWCASE . . .

New Literature

Nickel-cadmium storage batteries

. . . for industrial-engine starting and standby power applications, are detailed in four-page, two-color Bulletin 200. It provides selection data on batteries designed for starting diesel and gasoline engines, supervisory control, emergency lighting, and switch tripping. The bulletin lists descriptions, advantages, and construction data, and includes diagrams which show several ways in which the batteries can be installed in space-conserving rack arrangements. **Write or call: Nicad Div., Gould-National Batteries, Inc., Easthampton, Mass., for Bulletin 200.**

Torque converter

. . . and its application to shovel cranes is the topic of a new 16-page booklet which offers tips to assist an operator in getting greater production with less effort from a machine equipped with an engine-converter combination. Booklet 2740 defines torque, shows how it applies to shovel cranes, and gives a comparison of performance differences between torque converters and fluid couplings. It's written in nontechnical language and its contents are basically fundamental. **Write or call: Link-Belt Speeder Corp., 1201 Sixth Street, S. W., Cedar Rapids, Iowa, for Booklet 2740.**

Drawing-automation story

. . . is now available in a new 16-page illustrated reprint entitled "Making the Decision to Automate Engineering Drawings." The publication covers the why and wherefore of the Westinghouse decision to automate engineering-drawing reproduction, a detailed procedural analysis of the methods used and their applicability to both small and large firms. The reprint cites some of the immediate cost savings attained from automated engineering-drawing reproduction. **Write or call: Filmsort Co., Pearle River, N.Y., for Making the Decision to Automate Engineering Drawings reprint.**

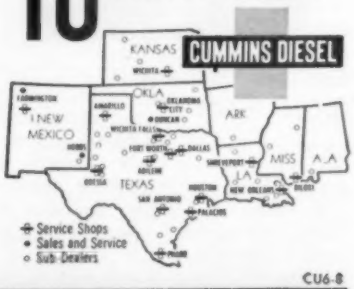
Internal-gear rotary pumps

. . . are described in new four-page Bulletin 1535 now available. It presents a discussion on how the pumps work, how they are constructed, and includes a complete list of applications. Charts cover capacities, r.p.m. tables, and construction materials.

Time is Money

Avoid profit-wasting downtime with Cummins dependable Diesels, backed by factory-type maintenance service. Our factory-trained mechanics are available day or night at 16 conveniently located service shops throughout the Mid-Continent area. It pays to standardize on Cummins Diesels.

16 FACTORY-TYPE SERVICE SHOPS



CU6-8

CUMMINS
Sales & Service, Inc.
P. O. Box 10338
FORT WORTH 14, TEXAS

One page pictures eight types of pumps and gives a short resume concerning operation of each. A complete dimension table with diagrams is included. **Write or call: Deming Co., 42 Broadway, Salem, Ohio, for Bulletin 1535.**

New dialysis system

. . . which treats acid liquors is described in six-page Folder WC-121. The folder covers design, operation, applications, and advantages of the unit, called Hi-Sep Dialyzer. Comprehensive engineering drawings show construction and operation. The folder shows why and how Hi-Sep provides high-rate separation and large-tonnage recovery. **Write or call: Graver Water Conditioning Co., 216 West 14th Street, New York City 11, for Folder WC-121.**

Two industrial TV cameras

. . . are detailed in new available Data Sheet 6-100. One model is the standard unit used in most closed-circuit applications. The other is specified when extreme noise levels are a hazard. The four-page publication also describes camera accessories, such as remote-control pantilt, and iris-focus units, an autozoom lens, and acoustical and weatherproof camera housings. **Write or call: Kin Tel Div., Cohu Electronics, Inc., P.O. Box 623, San Diego 12, Calif., for Data Sheet 6-100.**

Temperature monitors

. . . are illustrated in new 30-page Catalog 3036C now available. It describes a new monitor unit, a new indicator, and discusses details of operation, specifications, connections, and installation. One section concerns itself with resistance-temperature detectors. The section includes construction, accessories, and a table on temperature-resistance characteristics. **Write or call: Instrument Div., Thomas A. Edison Industries, McGraw-Edison Co., West Orange, N. J, for Catalog 3036C.**

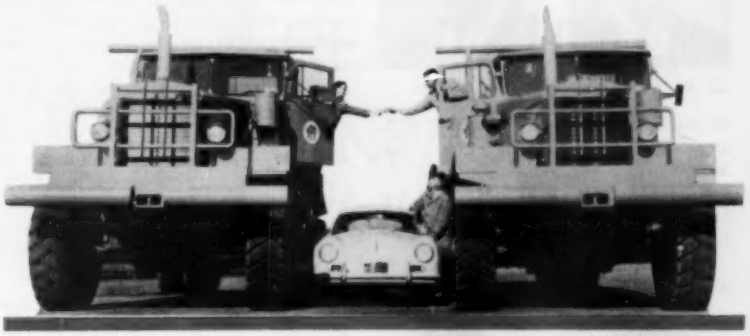
Geared-encoder systems

. . . are outlined in new four-page Bulletin 316, which gives general description, operation, output, and internal and external-geared assemblies. It includes detailed schematic drawings. Another new bulletin (two pages, No. 001), describes the system code which is translated from an Arabic to a Cyclic decimal number and then binary coded. Bulletin 001 gives mechanical processes and includes charts to illustrate. **Write or call: Datex Corp., 1307 South Myrtle Avenue, Monrovia, Calif., for Bulletins 001 and 316.**

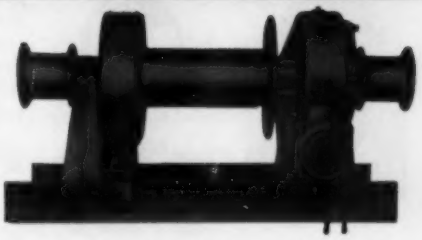
BIG EQUIPMENT takes BIG TRUCKS and BIG WINCHES

With oil field equipment getting larger and heavier the need for larger trucks becomes imperative. Two mammoth Mack trucks, with special rig-up by the Export Division of Hobbs Trailers — mounted by Dan Mitchell and Sons, Inc. of Corona, N. Y., is an example of the way transportation equipment manufacturers are filling this need.

Both of these trucks, now in use in Argentina, are equipped with a standard BRADEN MS50-20B winch. This BRADEN Winch was selected because of its ruggedness, and patented safety features that keep extremely heavy loads under perfect control.



The BRADEN MS50-20B weighs 1,786 lbs. and is 63" long from capstan to capstan. It has a safe rated capacity of 100,000 lbs.



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BRADEN Winches

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"In Service Around the World"

EQUIPMENT MEN

Cardwell, English firm reach

. . . an agreement by which Le Grand Rochester, Ltd., will manufacture Cardwell Mfg. Co. rigs at Rochester, Kent, England. Le Grand hopes to begin delivery before July. To ensure early delivery, some components will be imported from the states.

Magcobar makes five

I. W. Hoskins

. . . major executive changes involving I. W. Hoskins, Orien W. Van Dyke, Floyd A. Enz, Frank H. Loe, and John E. Lyons. They will be located in the Houston office and laboratory building of Magnet Cove Barium Corp. Hoskins was appointed to the newly created post of senior vice president in charge

O. W. Van Dyke

F. A. Enz

of marketing. He was formerly president and general manager of Mud Supply Co., Inc., the company he helped found in 1947. Hoskins has been active in drilling-mud marketing for the past 20 years.

Van Dyke, former vice president and technical director, was promoted

F. H. Loe

J. E. Lyons

to senior vice president, production and technical. Before joining Magcobar in 1944, he was with Philadelphia Quartz Co. Enz is the new vice president in charge of finance. In his 14 years with the company, he has served as auditor, comptroller, assistant secretary, assistant treasurer, vice president, and secretary-treasurer.

Loe, former assistant sales manager of the drilling-mud department, will fill the newly created position of vice president and sales coordinator. He started with the firm 13 years ago and served as purchasing agent and later as executive assistant to the president prior to taking on his sales manager post in 1955.

Lyons will succeed Loe as sales manager. He joined the company in 1946, served as a sales representative, and was promoted to assistant sales manager last year.

PNEUMATIC BULK TRUCK developed through the efforts of V. R. Burch, Upper Texas Gulf Coast manager of National Lead Co.'s Baroid Division, is capable of delivering 75,000 lb. of Baroid in 30 minutes. In case of blowouts, the truck is used at the well site as a feeder as it can transfer a constant flow of barite as fast as it can be supplied from other trucks. On a recent job in Galveston Bay, two men made possible the delivery of 2,000 sacks of weight material in 4 hours. Normally the job would require about 12 men working some 14 hours.

Axelson Division transfers

. . . George G. Browning to Shreveport, La.; Jack L. Thompson to Casper, Wyo., and Hugh D. Wiles to Hobbs, N. M., reports Lester G. Evans, vice president in charge of sales. Axelson is a division of U.S. Industries, Inc.

A. A. Hardy named to direct

A. A. Hardy

. . . engineering and research at W. C. Norris, Mfgr., a division of Dover Corp. William L. Butler, company president, announced Hardy's appointment to the newly created post. Hardy had been chief engineer since joining the company 13 years ago.

Continental-Emsco promotes

A. J. Olson

. . . A. J. Olson to chief application engineer; P. M. Davis to sales engineer, drilling structure masts; and C. W. Gwaltney to senior design engineer.

Olson, former chief engineer of the sales distribution division, joined Continental-Emsco Co. 32 years ago. He'll headquarter in Houston. Davis, who joined the firm in 1953 and previously held the post of mast sales specialist, will work out of the Dallas general offices. Gwaitney will headquarter at C-E's Houston plant.

C-E also announced the following appointments and transfers of store managers: William E. Lasseter, Oklahoma City; L. Z. Bolding, Liberal, Kans.; James C. Ellis, Morgan City, La.; James W. Dees, Houma, La.; Ray J. Opsal, Glendive, Mont.; and Owen L. Stone, Willistone, N. D.

Richard Gode joins sales

. . . staff of Enardo Mfg. Co. and will work out of the company's Tulsa headquarters, reports Frank P. DeLarzelere, sales manager. Gode had been president of Production Engineering & Equipment Co. Previously, he was chief engineer for Hoil Engi-

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You know the famous Mission Guarantee: "In a competitive test, Mission Products will outperform any other product or your money back." The Guarantee is good because the products are good.

You can get this same sweeping guarantee on renewed Mission liners. These renewed liners leave the Mission plant guaranteed as good as new. And that makes them the best liners you can buy. You get the same uniform hardening, the same extra deep hardening for longer life, the same accurate bore diameter which increases the life of piston rubbers and liners as you would get in a new Mission Liner. Packing and guide areas meet new liner specifications. Yet, you save substantially on the difference in cost between new liners and Mission renewed liners. This is an actual, real saving; and you are protected with the Mission Guarantee. You can start saving this guaranteed way with Mission renewed liners.

59-100

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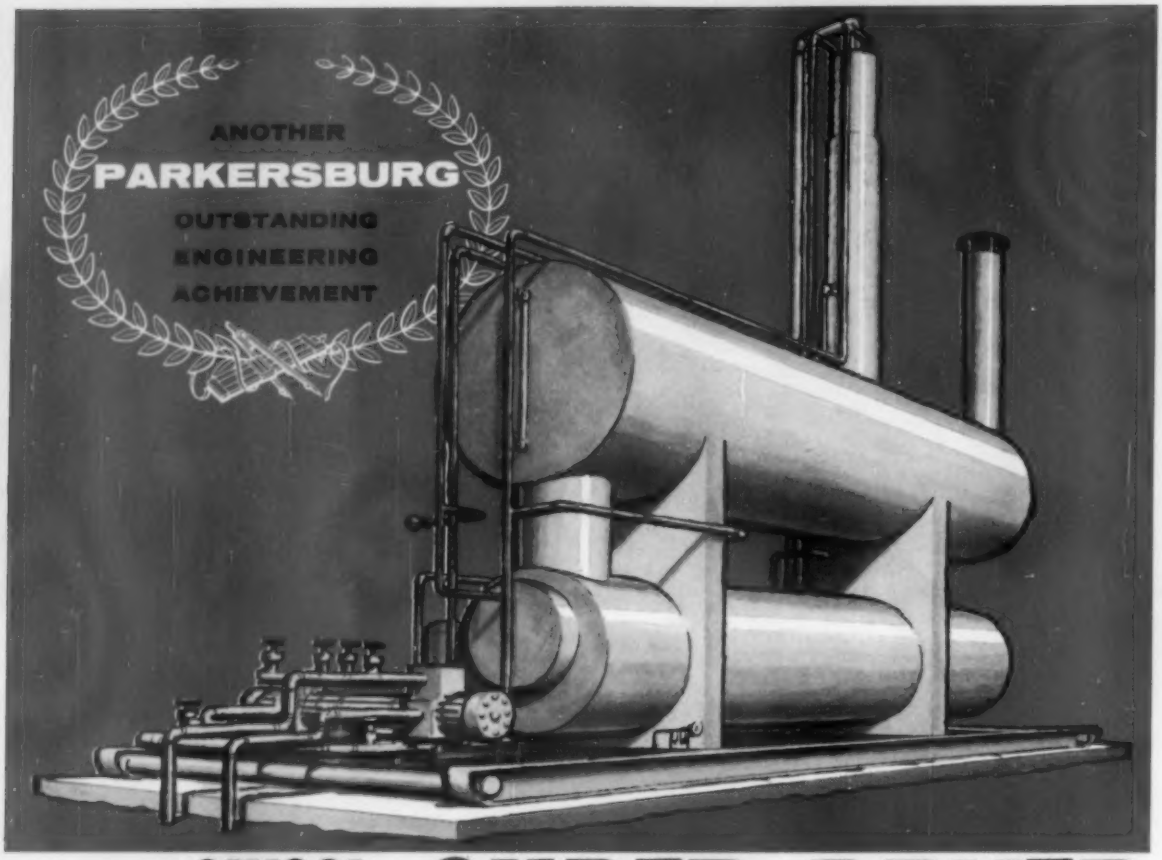

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Exclusives:

- Higher dewpoint depression with lower reboiler temperatures
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- Prevention of corrosion through airtight construction
- More water removal from glycol through better reconcentration

The PARKERSBURG Super-Dryer provides that *extra* service where conventional dehydrators are inadequate for the job, offering a *bonus* of safe reboiler temperatures demanded by such increased loads.

All units have completely automatic controls for unattended operation, even in sub-zero weather.

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neering Co., and chief designer and development engineer for the switch division of Century Electronics & Instruments, Inc.

J&L shifts personnel

W. R. Layne

...and sales districts, reported W. L. Wolfe, Jones & Laughlin Supply Division's vice president in charge of sales.

Oklahoma has been divided from two into three districts — southern, central, and eastern. W. R. Layne is the new sales manager for the southern district, which is located at Ardmore. The central district will continue to be headquartered at Oklahoma City under J. K. Guinn, but a new city sales office at Oklahoma City has been created with W. J. Whatley sales manager. The eastern district at Bartlesville is under the direction of sales manager A. A. Hopper.

J. A. Beaird

R. L. Daniel

Kansas has been divided into two districts under the new organization program—the eastern district at Wichita under J. A. Carrigan, and the western district at Great Bend. J. A. Beaird was promoted to western district sales manager.

The former West Texas and New Mexico area is being divided into two new districts. West Texas at Odessa is managed by G. A. Whiteker, and New Mexico at Hobbs will be under the managership of R. L. Daniel, newly appointed sales manager. The two districts are part of J&L's southeast region, presided over by F. L. McFarland at Midland, Tex. M. G. Burgeis, former salesman at Hobbs, was promoted to regional salesman for drilling equipment at Midland, and will report to McFarland.

The Mississippi district, under the direction of L. W. Todd at Laurel, has been included in J&L's Gulf Coast region, under the supervision of D. T. Ottinger at Houston.

Wolfe also announced that A. E. Penrose, formerly in Tulsa's production-equipment section, was promoted to regional salesman of production equipment for the Rocky Mountain region with headquarters in Denver.

F. R. DeWitt was assigned as store manager and supervisor for the Tulsa store area and E. L. Jackson was assigned as salesman and supervisor at Mt. Pleasant, Mich.

Dawson Lary is promoted

Dawson Lary

...from sales engineer to district manager of the New Orleans office of J. B. Beaird Co., Inc., reports Gerald Pope, general sales manager.

Lary, a Beaird employe for 7 years, will be joined by N. J. Chamberlain in the New Orleans office. Chamberlain had served as general-products representative in Houston since May 1957.

Bank stockholders name

...four new directors and three new members of the advisory board of the Texas National Bank of Houston, during an annual meeting held recently. In the directors meeting which followed, J. W. McLean, former senior vice president of the bank, was

HOUSTON HI-VAC INJECTOR DRILL H. D. 250

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NEW INJECTOR CORE RECOVERY THROUGH VISIOMATIC SAMPLE TUBES GIVES THE UTMOST IN SUBTERRANEAN TESTING

"SIX DRILLS IN ONE"

Drill speeds up to 5' per minute — especially designed to meet all drilling requirements — drills at any angle

DRILLS 2⅜" to 3⅛" HOLE to 250 FT.

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BUT EASY ON THE RODS
The H-F 3-Tube Rod Pump consists of two concentric, loose-fitting tubes (plunger and jacket tube) that telescope over and in a third, stationary tube which serves as the pump barrel. In operation, fluid is circulated in the annular space between the outer tube and the standing barrel which packs off and compensates for the loose plunger fit. This "fluid seal" design allows the plunger to fall freely so that the pump can be operated at the optimum pumping rate — even if a fast rate is desired — and yet be easy on the rods. The loose-fitting plunger and small plunger bore afford a number of other operating advantages, such as a higher fluid discharge velocity, keeping float sand in suspension, reducing failures due to excessive rod stretch, reducing plunger friction and abnormal wear of working parts, and preventing the plunger from sticking or galling due to sand or abrasion in the fluid. H-F 3-Tube Rod Pumps, with standard A.P.I. balls and seats, are available in 2" x 1¼", 2½" x 1¾", and 4" x 3¼", sizes in 12' to 25' lengths from leading stores throughout the oil patch. Either regular or on-and-off types can be furnished. Ask your store, or one of our representatives, for illustrated literature, or write P. O. Box 127, Fort Worth.
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3
TUBE
ROD PUMP
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"Best Pumps in the Oil Patch"®

elected president to succeed Harris McAshan. McAshan was named vice chairman of the board of directors along with R. D. Randolph, former senior vice president.

New directors are Harold Burrow, executive vice president, Tennessee Gas Transmission Co.; Kline McGee, senior vice president of the bank; A. W. Tarkington, senior vice president, Continental Oil Co.; and McLean.

New advisory board members are Donald McGregor, executive vice president, T. J. Bettes Co.; Leon M. Payne, attorney, Andrews, Kurth, Campbell & Bradley; Ross Stewart, chairman of the board, Stewart & Stevenson Services, Inc., and associated companies.

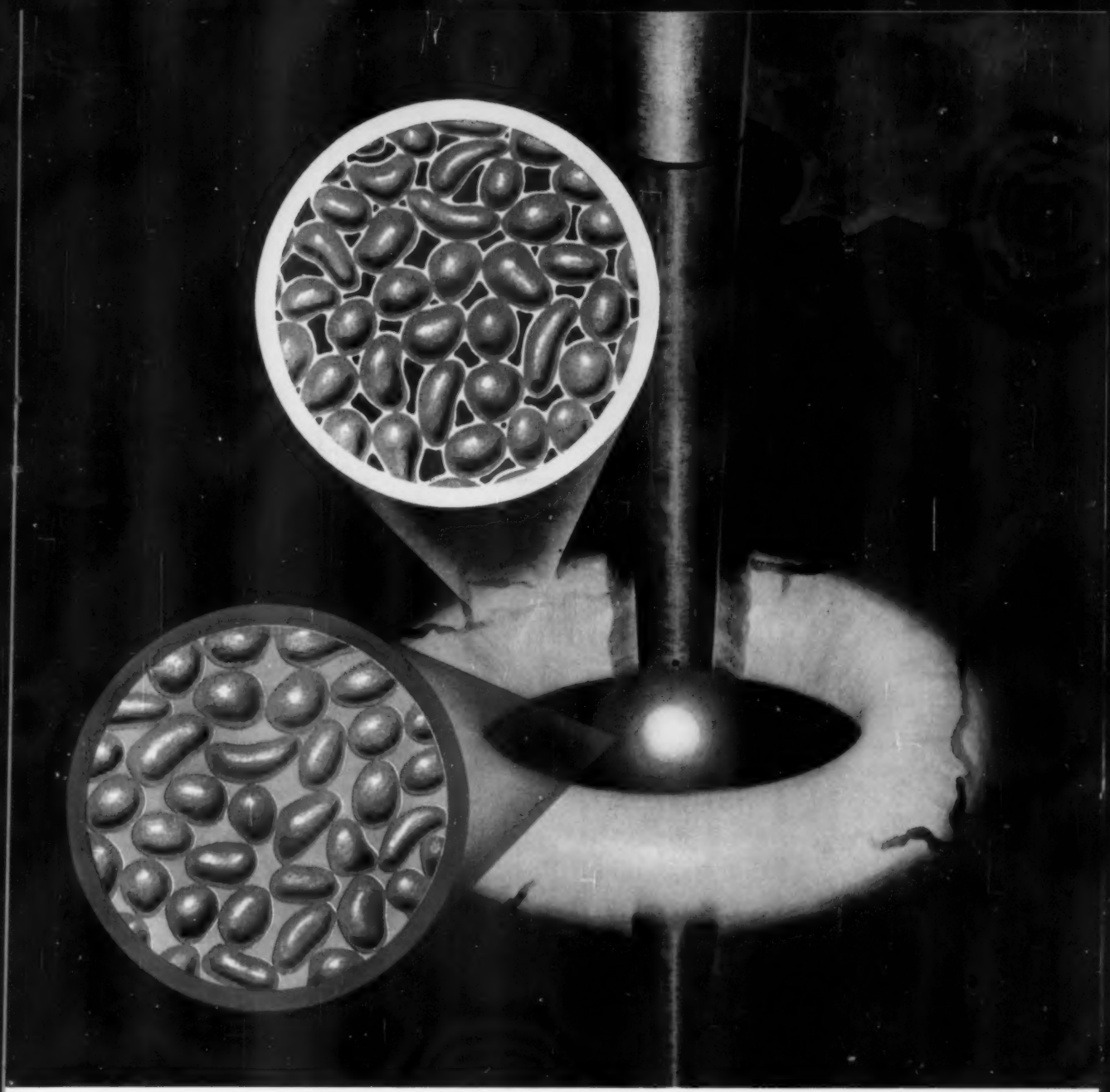
Butler named sales manager

. . . of plug valves for W-K-M, a division of ACF Industries, Inc. He will operate in Houston. Robert D. Butler spent 5 years as a sales representative for the company in the southeastern states. Last year he was promoted to assistant sales manager of plug valves.

George West is named

. . . a representative in South Louisiana for Well Equipment Mfg. Corp. He'll headquarter in New Orleans. The announcement came from John W. Gates, Well Equipment's sales manager.

RECEIVING AWARD for the best house publication entered in the 1958 Oklahoma direct-mail contest is Lloyd H. Lawrence (center), of Halliburton Oil Well Cementing Co. Carl Smith of Posters, Inc., Tulsa, makes the presentation for the Oklahoma Advertising Federation, while Dan Miller, of The Oil and Gas Journal, holds the entry. The Journal prints Halliburton's publication. The publication—Advertising Previews—is a monthly consisting of new service and product advertisements. It's distributed to key company employes before the ads appear in oil-industry trade journals. Advertising Preview also contains promotional messages from Grover Kilgore, sales and advertising vice president, and from Lawrence, Halliburton's advertising manager.



The Schlumberger Induction-Electrical Log Proves Production Possibilities

In all the vast areas where formations are soft to medium in hardness, and drilling muds are fresh, the Schlumberger Induction-Electrical Log most accurately portrays your production possibilities.

- A Short Normal Curve—recording the resistivity of the invaded zone largely flushed of its oil content.
- An Induction Curve—focused deep into the undisturbed zone of each successive formation—thick or thin.

Both measurements are invaluable to reservoir evaluation:

- To establish the presence of oil.
- To determine the percentage of saturation.

The Induction-Electrical Log was introduced by Schlumberger three years ago. Its superiority is now so widely accepted that 40% of all electrical logs run by oil companies in the United States and Canada are Induction-Electrical Logs.

Schlumberger—originator of logging and creator of its greatest advances—continues to lead the field with the Induction-Electrical Log.

AGAIN FIRST IN THE FIELD—FOREMOST IN RESEARCH

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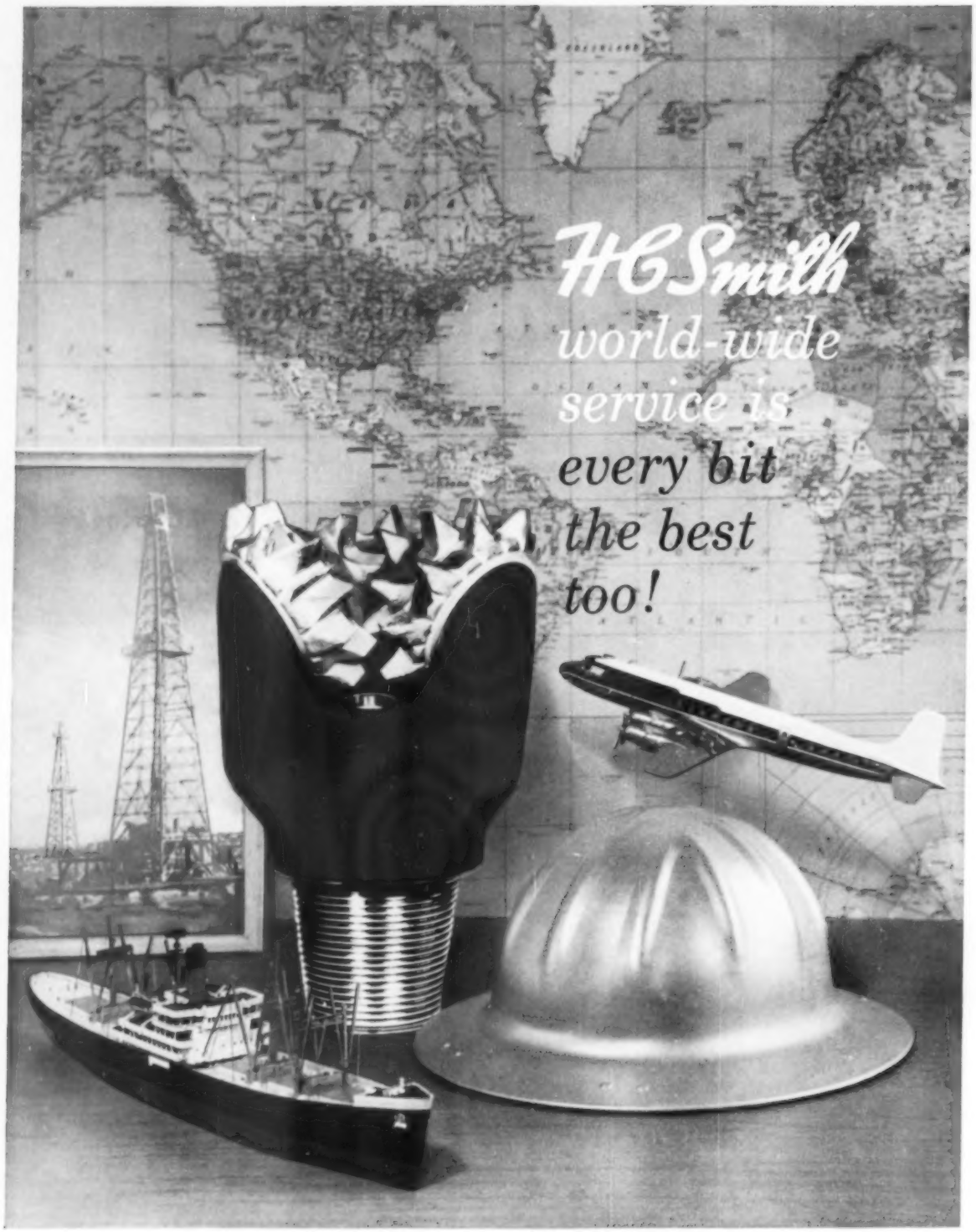

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FLOATING drilling barge CUSS 1, shown above, to be operated by newly formed California offshore drilling company.

New company begins operation of CUSS 1

A NEWLY FORMED offshore drilling, engineering, and construction company is taking over the operation of the floating drilling barge "CUSS 1" which has been doing exploratory core drilling in California's offshore waters the last 2 years.

The new company, Global Marine Exploration Co., is an offshoot of the former CUSS group (Continental Oil Co., Union Oil Co., Shell Oil Co., and Superior Oil Co.), which has been operating the drilling barge. Its officers include R. F. Bauer, president; A. J. Field, vice president and general manager; and Hal Stratton, vice president. All are former employes of Union Oil Co. of California and have been on the staff of the CUSS offshore group. Offices are at 650 South Grand Avenue, Los Angeles.

The barge (OGJ, June 30, 1958, p. 68) has drilled more than 400,000 ft. of hole in coring programs of the group off the coast of California. Currently, it is core-drilling for Standard Oil Co. of California on the Standard-Humble 5,500-acre offshore lease at Summerland. However, it is capable of drilling to 12,000-ft. depths either in relatively shallow or deep water. In its coring operations it has drilled successfully in water depths of 45 to more than 350 ft.

Bauer, president of the new drilling company, has been manager of operations for the CUSS offshore group since 1953. In this capacity he has been in over-all charge of research, engineering, construction, operation, and economics. He had been with Union Oil Co. of California since 1942, following his graduation from the University of Southern California. He started as a research engineer and later had a succession of assignments as production foreman, district superintendent, and division production engineer.

Field joined Union in 1947 as a roustabout. Since, he has worked as well puller, rotary helper, and drilling foreman before going with the CUSS group in 1953. With the latter, he has been responsible for petroleum engineering and economics. He is a graduate in civil engineering from California Institute of Technology, and has a master's degree in civil engineering from Stanford University. He served with the Navy Seabees in the Pacific as an engineer in waterfront construction.

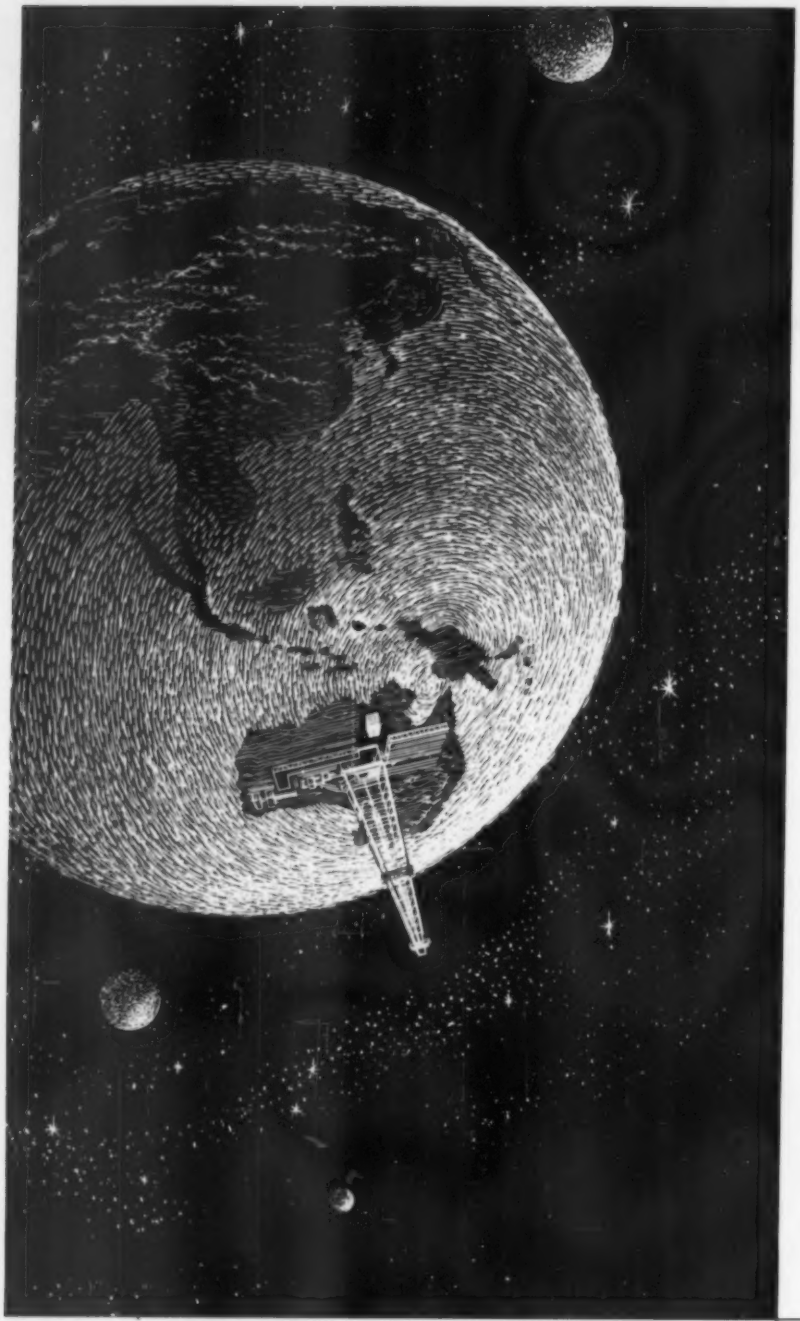
Stratton has been superintendent of offshore-drilling operations for the CUSS group since its inception in 1953. As such, he had direct charge of the engineering project which developed the floating drilling techniques, and the CUSS 1 drilling vessel. He had been with Union since 1949, also starting as a roustabout, and serving later as well puller, rotary helper, petroleum engineer, drilling foreman, and production foreman. He is a graduate petroleum engineer from University of Southern California.

Cameron joins Brown Drilling Co.

GEORGE E. CAMERON, for the past 7 years associated with Long Beach Oil Development Co., is joining Brown Drilling Co. and its affiliates as vice president in charge of finance.

In this capacity he will handle much of the liaison between Brown's far-flung foreign operations and its home office at Long Beach, Calif. Contracts and other arrangements with foreign governments and private groups will be included in his jurisdiction.

While with Long Beach Oil Development Co. Cameron was chief accountant. Previously, he had been with the H. F. Hunt firms at Dallas for 18 years, serving in various executive capacities.



Logging... Down Under

Alaska, Central and South America, . . . now *Australia* — another pin in Core Lab's map of overseas well logging and core analysis operations.

On the continent "down under" — Core Lab crews and equipment are scheduled to aid in the search for new oil and gas reserves.

Why Core Lab? Because Core Lab Well Logging units represent the most modern "package" of hydrocarbon detection equipment available to the industry today.

Specifically — these field laboratories feature a highly-efficient mud-pump / gas-trap / shale-shaker system, instrumentation for comprehensive recordings of related rig activity, and conventional core analysis equipment. Add either a Mass Spectrometer or an Infra-Red & Chromatograph system and the complete service becomes a veritable "super-tool" for exploratory work.

No effort or expense has been spared in the development and modernization of Core Lab's Well Logging Service, and the training of field personnel. The end result — a gratifying record of discoveries in many regions.

Now . . . Australia.

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Dollars cast a shadow over exploration

BY FRANK J. GARDNER

ONCE A YEAR, the nation's petroleum geologists assemble in annual convention. The exchange of ideas which takes place at these yearly sessions has benefited the oil industry in many ways. New theories, new methods, and new approaches to finding oil—these are the keynotes upon which the meetings hinge.

This year the convention goes to Dallas, or "Big D," as Texans like to call it. The American Association of Petroleum Geologists and the Society of Economic Paleontologists and Mineralogists will once again be sitting in joint session in the heart of the oil country. For 4 days, March 16-19, the two groups will apply themselves to a single important theme: "The Fundamentals of Oil Finding—Application of Geology, Geophysics, and Economics."

Learning about the dollar . . . The appearance of the word "economics" at the tail end of that theme is highly significant. The oil-finding professions have never been acclaimed as economics experts, exactly. As a matter of fact, in recent years, much of the blame for the rising cost of finding oil has been laid at their door. "We can't seem to impress upon our geological staff the importance of the almighty dollar," says one economics expert. "They want more and more expensive instruments, a longer list of gadgets, more money for laboratories. They didn't used to have those things, and they found more oil!"

All this is changing. More and more, we find the dollar sign appearing as a shadow across the exploration prospectus. The geologist is increasingly conscious of the economics department down the hall. The question "Will it produce?" now must yield before "Will it pay?" This growing emphasis on the economics of exploration is reflected in the program of almost any oil convention today.

In the marketplace of oil . . . At the recent meeting of the Rocky Mountain section of the AAPG in Albuquerque, the keynote speaker, Merrill W. Haas, vice president and director of Carter Oil Co., had this to say: "Explorationists have a commodity to sell—the art of finding oil—but it must be found more economically. Unless costs are cut, cheaper produced crudes or some other form of energy will supplant domestic crude . . . The number of geologists will dwindle and those who survive the 'exploration depression' will be employed in foreign lands . . . The only way to keep exploration alive is to find more oil with less dollars."

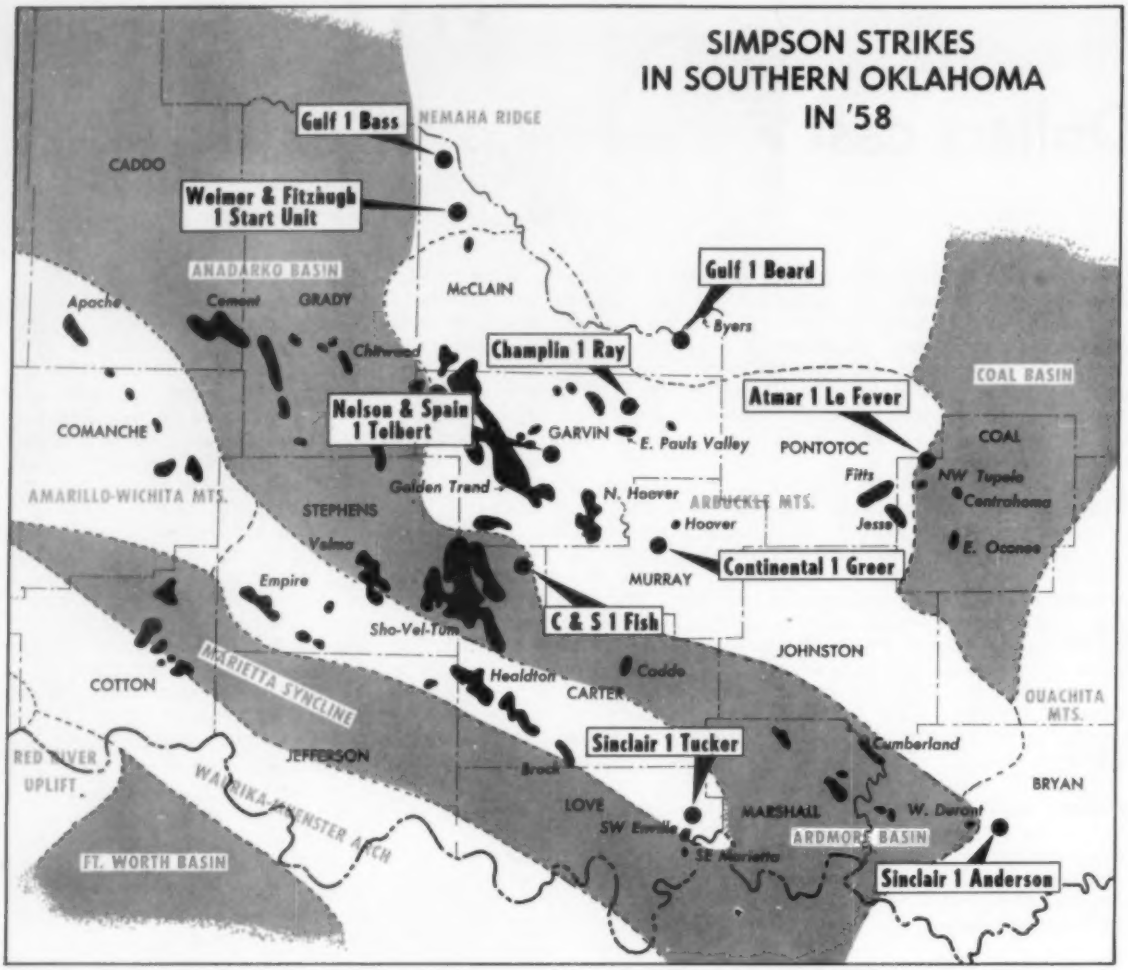
Haas, a professional geologist himself, pointed out that the future trend in replacement cost per barrel of crude will inevitably be upward. To preserve his profession and to keep the crude he finds on a competitive basis, Haas had some good advice for the explorationist:

- Exert leg work in behalf of strong conservation statutes.
- Don't use costly methods in areas where they're not applicable.
- Produce more crude with fewer wells; advocate wider spacing.
- Urge unitization for new fields.
- Find ways to cut drilling, testing, and completion costs.

There is a great deal of new oil to be found in the United States, both in the old oil country and in the yet-untouched. The bulk of it will probably lie in hard-to-find stratigraphic traps. The recipe for finding this oil calls for expensive ingredients: deeper drilling, bolder wildcatting, greater numbers of "information only" tests, and . . . most important . . . more **people.** Haas, in his Albuquerque speech, put it this way: "Because of the many facets of stratigraphic work, more people are required to develop a prospect. Considerable concern has been expressed because exploration results have not kept pace with the growth in geologic man power . . . The answer is simple. Stratigraphic studies require large numbers of professional talent."

The explorationist is not to be wholly blamed, then, for the increased cost of finding oil. His gear is more expensive, his quarry more elusive. These go hand in hand. The important thing is that he is conscious of his problem, and that "economics" is appearing ever more often on the marquee of the convention theater.

DELEGATES to the annual convention of the AAPG and SEPM will be welcomed to "Big D" by this large display at Dallas' Love Field air terminal. W. Dow Hamm, left, is general chairman for the March 16-19 meeting; Joseph M. Wilson, right, is head of the reception committee.



In southern Oklahoma . . .

The Simpson rewards oil hunters

Finding 42 Simpson pools in 38 years is no feat, but 53 additional fields discovered during the next 8 years is noteworthy. In most people's books, 1958 was no banner year, yet a record-tying total of 10 new Simpson fields were found in southern Oklahoma. Hopes for '59 are great.

BY PETER B. BIKE

IT PROBABLY ALL STARTED with the prolific Cumberland find by Pure Oil Co. in 1940. This Marshall-Bryan County pool uncovered excellent reservoirs in the Bromide, McLish, and Oil Creek sections. Analytical studies of pay characteristics undoubtedly gave an assist to the flourish of exploratory drilling that followed. At the end of 1958 Cumberland accumulative production was 54,557,000 bbl., with estimated recoverable reserves of 20,000,000 bbl. (OGJ, Jan. 26, 1959, p. 144).

Until Cumberland, interest in the Simpson group was primarily concentrated on the Bromide section. The other formations: Tulip Creek,[1] McLish, and Oil Creek have long since abandoned their roles of also-rans and have joined the group as prime objectives. Only the Joins remains to be admitted to the inner circle as a prime objective. A single pool—East Washington—in McClain County produces from Bromide and Joins.

The Texas Co. kept the ball rolling in 1941 with their tremendous Apache discovery in Caddo County. Good wells resulted from thick Bromide pays. The same year the Pennsylvanian was top dog at Velma. Bromide was encountered there which further fanned the fires in the Simpson search. This resulted in new oil in 1942 at Pauls Valley in the Bromide and Oil Creek, at Aylesworth from the Bromide and Tulip Creek, and at Caddo Deep from the Bromide.

THE BOX SCORE on Simpson Group Production

Period	Fields discovered
1913-1930*	6
1931-1940	3
1941-1945	13
1946-1950	20
1951-1955	24
1955-1958	29
Total	95

Rundown of Recent Years

Year	No. fields	Year	No. fields
1941	2	1950	2
1942	3	1951	2
1943	0	1952	5
1944	3	1953	9
1945	5	1954	2
1946	4	1955	6
1947	4	1956	9
1948	5	1957	10
1949	5	1958	10

*Figures shown are at end of year.

SIMPSON discoveries have mushroomed under intensive postwar exploration in southern Oklahoma.

The war slowed down general operations during the 1942-1945 period and the boom continued in earnest in 1946 looking for another Cumberland.

Postwar activity . . . The search was on and exploration managers were beginning to hold higher hopes for Simpson targets. Significant reserves were found at Northeast Bradley, Grady County, in 1948 from the Bromide and Tulip Creek zones.

False hope was raised when the discovery well by Texaco in 1951 opened the Southeast Mannsville pool, Marshall County. Subsequent development resulted in a single pay from the McLish. Nearly as many dry holes as producing wells were drilled before the program ended and this field proved small in area.

Not until Sinclair Oil & Gas Co. uncovered the North Madill pool in 1955 was any great stimulus offered for finding another Cumberland. This Marshall County success showed that determination has both its virtue and reward. Production was obtained from the Bromide, Tulip Creek, and McLish zones. Gas shows were tested in the Oil Creek sand.

Next British-American Oil Producing Co. crashed the depth barrier at Carter-Knox in Stephens County with Bromide and Tulip Creek production at depths of 15,000 to 16,000 ft. This had three-way significance: new depth records were established, Simpson pays were further enhanced, and need for forming units for deeper drilling was recognized and practiced successfully. New techniques were developed to cope with high pressure and temperature problems.

The hunt shifted to the north with Sinclair carrying the ball again. Focal point of interest was Caddo County and high hopes were held for striking a companion structure of Apache's magnitude. The Sinclair-Cities Service 1 Susie romanced the operators into thinking they had accomplished just that. In September 1956, oil was produced from the Bromide sand and after two offsets resulted, the Northeast Alden pool was realized to be smaller than initially anticipated.

Oil Creek scores again . . . Attention swung south to Love County and exploration managers were jolted into recognizing that the Simpson was not to be denied. Not since Cumberland had the Oil Creek sand beckoned with such sincere enthusiasm. Again Texaco led the way with its flush Oil Creek sand producer in March of 1957 at the Southwest Enville pool. Thus the cycle started by Pure at Cumberland in 1940, and currently pausing with the latest 1958 discoveries, continues with the Simpson holding greater promise than ever.

Countdown in 1958 . . . Successful wildcats in the Simpson of southern Oklahoma in 1958 included:

- Gulf Oil Corp. 1 Beard, 18-5n-3w, McClain County; first Bromide, second Bromide, and Tulip Creek pays; completed in February, Northeast Criner field.
- Atmar Drilling 1 LeFever, 3-2n-8e, Coal County, Oil Creek pay, completed in March, South Lula field.
- C & S Oil 1 Fish, 10-1s-2w, Carter County, Bromide pay, completed in April, Homer field.
- Sinclair Oil & Gas 1 Anderson, 2-7s-9e, Bryan County; Bromide, McLish, and Oil Creek pays; completed in May, East Durant field.
- Continental Oil Co. 1 Greer, 34-1n-2e, Murray County, third Bromide pay, completed in May, Southwest Sandy Creek field.
- Nelson & Spain Drilling Co. 1 Tolbert, 34-3n-1w, Garvin County, first Bromide pay, completed in May, unnamed field.
- Sinclair Oil & Gas Co. 1 Tucker, 32-6s-3e, Love County, Oil Creek pay, completed in July, West Enville field.
- Champlin Refining Co. 1 Ray, 31-4n-2e, Garvin County, Bromide pay, completed in October, Civet field.
- Gulf Oil Corp. 1 Bass, 36-9n-4w, McClain County, Tulip Creek pay, completed in December, unnamed field.
- Weimer & Fitzhugh 1 Start Unit, 18-6n-3w, McClain County, Bromide pay, completed in December, unnamed field.

Outlook . . . The progression of Simpson importance parallels an ungainly sister who has grown into the belle of the ball. Presently each of the formations comprising this group offer an intriguing potential. Drilling will be deeper. The quest will be more widespread. Structures now unknown will be located and tested. Stratigraphic considerations will be evaluated. The

emphasis has been placed on structures associated with faulting—but what about the large basins? How much do we know about them—are they to be written off without evaluation?

Carter-Knox has opened the gateway for deeper drilling. The geologist looks—and looks hard—at drilling depths below 15,000 ft. Management points even more of a jaundiced eye at deeper holes and the costs involved. If the results justify the expenditures the rewards are there. Now the depth factor is evaluated from the aspect of whether to go it alone, or unitize. Increased technology gleaned from experience minimizes the mechanical hazards which was the former bugaboo. Yes, deeper drilling will come to southern Oklahoma. In areas where 12,000 ft. are presently deep ventures bottoming in the Pennsylvanian, we can expect future Ordovician wells in the 15,000 to 17,000-ft. range.

Looking at a regional map of southern Oklahoma, one notes a vast area between the fields shown. It is a certainty that these are not the only places that the Simpson group will produce. What potential lies east of Durant and west of Apache? Vertical extensions of existing production in shallower formations would be an excellent starting place for producing the Simpson. Then would follow the lateral outposts.

Perhaps one approach to the problem of locating Ordovician production would be to make regional maps where the basal Simpson is not deeper than 10,000 ft. This could be followed by a map where the Simpson-Ordovician is not deeper than 15,000 ft. Don't count out the subthrust folds. Many thrust faults are known to have associated folding under the fault plane. It will take deeper drilling and intensified seismic exploration to pinpoint the areas of interest. Carter-Knox proves it can be done.

Presently the emphasis has been placed on the structural trends and extensions of their axes. Almost everyone has looked, to some degree, at the positive areas and the flanks of basins. What about the interiors of the basins? Since basins have come into their own in recent years, i.e., the Powder River, Permian basin, the San Juan basin, and more lately the northwest flank of the Anadarko basin, let's not ignore the basins in southern Oklahoma.

These include the Anadarko basin, the Ardmore basin, the Marietta syncline-Sherman basin, the Coal basin, and the Hollis basin. Each is believed to have its respective merits for stratigraphic or structural possibilities. Let's face it—Simpson oil in southern Oklahoma holds a radiant future.

Reference

1. Nomenclature regarding the Tulip Creek is controversial. Some stratigraphers prefer to call it third Bromide in place of Tulip Creek. Others use basal Bromide or upper McLish in lieu of Tulip Creek. Another group classifies Tulip Creek as a distinct and separate formation of the Simpson group.

Multipay Oklahoma field grows

NORTH BUFFALO, hailed as last year's discovery of the year in northwestern Oklahoma, is growing. This multipay reservoir is fast gaining stature as an important new hunting ground in Harper County.

Sinclair Oil & Gas Co., sire of this play, has indicated Arbuckle Cambro-Ordovician production at the 1 Miller in C NW NE 7-28n-22w. This well offsets the discovery well which also bore Arbuckle oil. A test was taken at 7,568-7,617 ft. Recovery was 4,617 ft. of 50°-gravity oil and 840 ft. of mud-cut oil.

Other North Buffalo events include a 50-bbl. per hour flow from Lansing Pennsylvanian lime at the 1 Kuhn in C NW SE 6-28n-22w. Flow was through 40/64-in. choke; An-Son Petroleum Co. 1 Miller, C NW NW 8-28n-22w, east extension try, flowed 32 bbl. of oil and 100 bbl. of water in 11 hours on ¾-in. choke from Lansing at 4,584-87 ft.; An-Son also may have a hit at 1 Aitken in C NW SW 9-28n-22w. Recovery on drillstem test of the zone at 5,814-32 ft. got 160 ft. of oil and 90 ft. of mud-cut oil.

More oil for Sooner's McClain

BIG BROMIDE sand Ordovician production is indicated at a wildcat in McClain County, South Central Oklahoma. The new strike is Weimer and Fitzhugh and Jones and Pellow Oil Co. 1 Hester, C W½ NE SW 23-6n-4w.

Bromide sand production is found at 11,809-65 ft. This zone yielded 40 bbl. of oil per hour on test. A test at 11,866-92 ft. got 4,560 ft. of oil; a test at 11,893-11,919 ft. got 810 ft. of oil.

Location of this promising new pool prospect is 2 miles southwest of production (Northeast Criner field). The new Bromide news in southern Oklahoma gives impetus to the continued search for the thick, deep, and prolific Ordovician sands in this section of the state—a trend that began a couple of years ago; a trend that shows no signs of dying out.

. . . and Eola district

Good production is reported at a deep Eola district well in Garvin County, southern Oklahoma. Pan American Petroleum Corp. dually completed the 1 Wiley in C SE SW 4-1n-3w. Production was found in the basal Bromide-Ordovician sand and the basal Oil Creek Ordovician sand.

The zone at 10,470-75 ft. got 304 bbl. of oil in 13 hours on 18/64-in. choke with 530 M.c.f.d.; the zone at 11,396 ft. to 11,456 ft. in Oil Creek flowed 215 bbl. of oil per day on ¼-in. choke with 185 M.c.f. of gas.

B.C.'s Clarke Lake confirmed

IN BRITISH COLUMBIA Gulf States Oil Co. of Canada, wholly owned subsidiary of Western Natural Gas Co., as operator, announces the completion of its 2 Clarke Lake gas well as the first followup extension well to its 1-A Clarke Lake major gas discovery last winter.

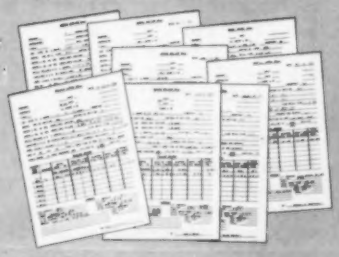
The 2 Clarke Lake well encountered 170 ft. of continuous porous dolomite in the Middle Devonian and was completed for an estimated open flow of 22,500 M.c.f.d. of gas. The 2 Clarke Lake is located approximately 1½ miles northeast of the discovery well which encountered 82 ft. of continuous porous dolomite in the Middle Devonian.

These wells are located on British Columbia Petroleum and Natural Gas Permit No. 195, comprising 252,672 acres, which is about 10 miles due east of the town of Fort Nelson, B. C., and is owned 25% by Gulf States Oil Co., 25% by El Paso Natural Gas Co. and 50% by Imperial Oil, Ltd.

The operators have moved the rig and are currently drilling their 3 Clarke Lake well which is approximately 5½ miles due east of the discovery well, and upon the completion of this well they plan further step-out drilling in the area.

Stop fishing for bit cones... NOW! mill them up *fast* with SERVCO Junk Mills

Write for actual job records and complete information on the Servcoloy process.



* U.S. PATENT NO. 2,833,638

The following data were taken from four actual job records where Servco CJ Junk Mills were used to mill up bit cones. These jobs are typical examples of how drilling operators are profiting from the use of Servcoloy*-dressed milling tools.

JOB NO. 1

After three cones from a 6⅛" bit were left on bottom, two rock bits, two hydro-bailers, and two junk baskets were run during a three-day period in attempts to either recover or sidetrack the three cones. Results were negative.

A six-inch Servco CJ Junk Mill dressed with Servcoloy was then used to mill up the three cones. A total of two feet of hole was drilled in a period of two hours of milling. The operator ran back with a bit and proceeded to drill a head. Fine steel cuttings were caught on the shaker during the milling and appeared on the mud screen during the succeeding day showing that the cones were actually milled up, not sidetracked.

JOB NO. 2

Two cones from a 6" bit had been left on bottom. Attempts to recover or sidetrack the cones with junk baskets, a magnet run, a junk snatcher run, a jet shot which could not reach bottom, and a rock bit run to sidetrack were unsuccessful over a three-day period.

A 5⅞" Servco CJ Mill dressed with Servcoloy was used for a period of two hours during which a total of five feet of hole was made and the bit cones milled up. The operator resumed drilling ahead and encountered no more junk.

JOB NO. 3

Two cones from a 6" bit were left on bottom.

A Servco CJ Junk Mill dressed with Servcoloy was run immediately and within a period of four hours the junk was milled up and five feet of hole was made. No junk was encountered in subsequent drilling.

JOB NO. 4

The loss of one cone from a 9⅞" bit, and then the loss of a cone from another bit in an attempt to sidetrack resulted in two 5¾" O.D. bit cones on bottom. Attempts with a junk basket, core barrel and magnet were unsuccessful during a three-day fishing period.

A Servco 9⅝" CJ Junk Mill dressed with Servcoloy was then run for a period of 8½ hours during which time the cones were milled up, not sidetracked, and 20 feet of hole drilled.

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Wyoming's Penn hopes solidify

IN the Powder River basin, Pan American Petroleum Corp. has completed a second confirmation well in Robinson Ranch field, Crook County, Wyoming, bringing to three the number of wells now producing in that important new discovery area.

Pan American 2 Robinson, a ¼-mile extension south of the 1 Robinson discovery well, recovered 28°-gravity oil at the rate of 231 bbl. a day on a potential pumping production test.

Recovery was from two zones of the Minnelusa, topped at 6,119 and 6,150 ft., respectively. The well was drilled to a total depth of 6,281 ft., plugged back to 6,207 ft. Pan Am is now drilling two additional wells at Robinson Ranch.

The 2 Robinson, which is located in 32-50n-67w, is the third completion by Pan Am at Robinson Ranch, since the firm's discovery well was completed in December 1958 for a pumping potential of 294 bbl. a day.

In January, Pan Am completed a confirmation well, State of Wyoming "C" No. 1, for a flowing potential of 228 bbl. of oil in 10 hours on a 22/64-in. choke. The State "C" is jointly owned by Pan Am and Husky Oil Co., and is a ½-mile-north extension of the discovery well.

The 1 Robinson, discovery well, and the 2 Robinson are located on a 6,000-acre tract owned 100% by Pan Am. The State "C" No. 1 is located on a separate 160-acre tract in which Pan Am and Husky own 50% interest each and Pan Am is operator.

Nearest Minnelusa production to Robinson Ranch field is about 5 miles west in Donkey Creek field. The Robinson Ranch field is located near the town of Moorcroft, Wyo.

Oklahoma's Ellis hits twice

TWO WILDCATS hold current exploratory interest in northwestern Oklahoma—both are in Ellis County, a booming new Morrow Pennsylvanian oil and gas reservoir.

Magnolia Petroleum Co. made natural-flow test at its 1 Meier strike in C SE NW 36-20n-26w. The well flowed 9,980 M.c.f.d. of gas on ½-in. choke from perforations between 10,668 and 11,167 ft. in the Morrow. Later it flowed 10,900 M.c.f.d. This new discovery is located southeast of Goodwin in western Ellis County.

The other Ellis strike is Odessa Natural Gasoline Co. 1 Potter in C SE NW 12-19n-22w, in a remote area of the county near Harmon. This one is many miles from any production. After a shut-in period, the well was opened to flow 201 bbl. of oil and 30 bbl. of load water in 15½ hours from Cottage Grove Pennsylvanian sand perforations at 7,980-94 ft.

This flow died in 12½ hours. A swab was then run twice. Then the well flowed 11 bbl. of oil per hour on the last 3 hours of gage.

California's Parcel B well is dry

THE FIRST reported dry hole on one of the five offshore parcels which attracted record bids last summer was reported by Standard Oil Co. of California on Parcel B. Standard, as operator for itself and Humble Oil & Refining Co., abandoned at 6,670 ft. a wildcat drilled in 160 ft. of water about 1 mile from shore. The test was drilled from Global Marine Exploration Co.'s floating drilling barge, CUSS I. Standard said it would review the information obtained from the dry hole before planning any further operations on the 3,840-acre lease off Santa Barbara County.

Standard and Humble were awarded the lease last year on a cash bonus bid of $771,000. The parcel was one of five which drew cash bonus offers exceeding $55,000,000 in total. However, Parcel B was far below the others in attractiveness. Parcel A, 2 miles to the east of it, went to a group headed by Phillips Petroleum Co. for $13,550,000 while Parcel C, 2 miles west of it, went to Standard and Humble for $12,423,598.

The Standard - Humble bid of $771,000 caught the California State Lands Commission by surprise and the lease was originally held up a couple months after recommendations were made to the state it be rejected. However, Standard and Humble were finally given the parcel after several

meetings with the commission where the oil companies were able to present evidence supporting their seemingly low bid.

Important offshore pool confirmed

IN CALIFORNIA, Standard Oil Co. of California completed its second well on the 5,500-acre offshore lease it holds jointly with Humble Oil & Refining Co. at Summerland.

Like the first well, details on the second completion were not available.

Las Vegas test due in Clark

COLMARRAN Oil Products Co., Inc., was rigging a rotary for a projected 6,000-ft. wildcat in SW NW 26-22s-60e, in Clark County, Nevada. The drill site is in the region of Arden Dome, 10 miles southwest of Las Vegas.

N. E. Ohio oil hinted

IN OHIO Belden & Blake reported indications of a new oil pool in the Conneaut area. Belden & Blake's 2 T. & C. Hinchcliff, Section 24, Denmark Township, Ashtabula County, found the Clinton at 3,485-3,504 ft. with an oil showing and gaged 281 M.c.f. and 10 bbl. after acid fracture. The well is 3 miles southwest of production.

Eastern gas hunt continues

PENNSYLVANIA development work is picking up despite winter floods.

Phillips Petroleum Co. completed a new wildcat discovery in the Leidy field area of Potter County. After fracturing, the well made 310 M.c.f. of gas with rock pressure of 4,054 psi. in 118 hours from the Oriskany sand at 6,744 ft. Total depth is 6,775 ft. The well is the No. 1 Tract 81.

Elk County . . . Dents Run Coal Co. No. 2, a New York State Natural Gas Corp. wildcat on the Sabinsville anticline in Elk County, 21 miles northeast of the new Tract 65 pool in Clearfield County, didn't find the Oriskany pay. The Tract 65 pool is producing from Oriskany. Since the Oriskany is found on southeast flank of the anticline, this dry hole might have been too high on structure.

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In addition to the E-P qualities, you get many other advantages with Seeco-Mul. Inasmuch as Seeco-Mul is a chemical emulsifier with superior wetting abilities, it is often run in so-called "soap" drilling fluids (the addition of detergents to fresh water muds, oil-and-water, and water-clay systems) to lower the surface tension, thereby wetting the formation ahead of the bit and keeping the bit clean. Such systems also afford a faster penetration rate and aid the suspended solids to drop out in the pits.

Too, with good lubricating qualities in the mud, less drill stem torque is required, pump pressures can be lowered and more evenly sustained, and a higher velocity of the fluid on bottom can be obtained . . . all of which means longer service life for liners, collars, tool joints, drill pipe, and the bits themselves.

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Let us show you how you can use Seeco-Mul profitably. We'll gladly send you illustrated literature and a lab sample of Seeco-Mul, or contact your local mud dealer. You can get full particulars without obligation.

[1] *McCutcheon, John W., "Synthetic Detergents."*

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Discovery wells

CALIFORNIA

Kern County: Reserve Oil & Gas Co. 311-19 "W-T," NW NW 19-11n-19w, dual completion, upper zone perfs. 9,378-9,426 ft., 9,451-67 ft., 9,511-23 ft., 9,535-9,790 ft., 800 BOPD, 20/64-in. choke, 35.7° gravity, 0.6% cut, 725 M.c.f. Lower zone perfs. 11,384-11,715 ft., 321 BOPD, 30.7° gravity, 1.4% cut, 28/64-in. choke. TD 11,717 ft. (New lower Miocene pool discovery in Highway area of North Tejon field.)

Glenn County: McCulloch Oil Exploration Co. of California, Ltd., 1 McCulloch WWH Unit, SE 14-19n-2w, dual completion, upper zone perfs. 3,983-4,089 ft., 5 M.M.c.f.d., 24/64-in. choke. Lower zone perfs. 4,657-4,703 ft., 5 M.M.c.f.d., 24/64-in. choke, TD 7,360 ft. (Extension test ¾-mile southeast of production in Beehive Bend gas field.)

Ventura County: Union Oil Co. of California 1 Hill, NW NE 22-3n-21w, 724 BOPD, 18% cut, 25/64-in. choke, 658 M.c.f., perfs. 10,780-9,654 ft., TD 11,193 ft., Deeper pool discovery on west edge of Bridge pool, South Mountain field.

WESTERN CANADA

Alberta: Canadian Superior-Home 8-31-30-3 Westcott, LSD 8, 31-30-3w5. Cardium oil discovery. TD 8,916 ft.

Union Oil Co. of California 4-12-87-8 Red Earth Creek, LSD 4, 12-87-8w5. Granite Wash oil well. TD 4,977 ft.

Shell 6-34 Swan Hills, LSD 6, 34-64-13w5. Beaverhill Lake oil discovery. TD 9,820 ft.

Saskatchewan: Oliphant - Tidewater 4-19 Rapdan Crown, LSD 4, 19-4-19w3. Lower Shaunavon oil discovery. TD 4,800 ft.

COLORADO

LaPlata County: Val Reese & Associates 1-35 Bascom, 35-33n-11w. IP 2,898 M.c.f.d., Dakota 7,816-7,970 ft. TD 7,980 ft. Dakota discovery.

Washington County: Vaughey & Vaughey 3 Alexander, C NE SE 1-1s-55w. IP 30 BOPD, 30 BWPD, "J" sand 4,921½-26 ft. TD 5,019 ft. New pay discovery.

ILLINOIS

Edgar County: W. T. Larson 1 Hawkins, SE SW SE 26-13n-14w. IP 284 M.c.f.d Penn. 411-422 ft. TD 422 ft. Opens South Kansas field.

Wayne County: A. C. Davis 1 L. Winsenburger, NE NE NW 18-3s-9e. IP 110 BOPD, Rosiclare 3,386-92 ft.; McClosky 3,425-34 ft. TD 3,434 ft. Extension to Golden Gate Consolidated pool.

INDIANA

Gibson County: Chambers & Dewus 1 W. I. Ross, NE NE NE 7-2s-9w. IP 17 BOPD, Aux Vases 1,716-28 ft. TD 1,728 ft. Extension.

Vanderburgh County: Mayhew Oil Co., Inc., 1 J. Steckler and J. Rexing Community, NW NE NW 32-4s-11w. IP 130 BOPD, 3 BWPD, McClosky 2,561-66 ft. TD 2,568 ft. Extension discovery to Martin field.

KANSAS

Barton County: White Eagle Oil Co. 1 Karst, NE NW SE 11-16s-15w. IP 50 BOPD, 39.5°, Lansing 3,193-96 ft. TD 3,454 ft.

Sterling Drilling Co. 1 Popp, SW SW NE 3-16s-14w. IP 11 BOPD, 42% b.s. and w., 33.3°, Arbuckle 3,352-57 ft. TD 3,357 ft.

CRA 1 Birzer, W½ SW SW 36-18s-12w. IP 40 BOPD, Lansing 3,164-70 ft. TD 3,455 ft.

Butler County: E. H. Adair 1 Schrivner, SW SW SW 24-23s-3e. IP 87 BOPD, 37.3°, Mississippian 2,468-81 ft. TD 2,481 ft.

Cowley County: The Texas Co. 1 C. W. Estep, NE SW SE 21-34s-6e. IP 58 BOPD, 22% b.s. and w., 41°, 2,009-10 ft., 1,803-07 ft. TD 3,502 ft.

Ellis County: Tom Allan 1 Keller, SW NE SE 2-11s-20w. IP 51 BOPD, 20% b.s and w., 30.1°, Lansing 3,348-53 ft. TD 3,670 ft.

Birmingham & Bartlett 1 Herbert, S½ SE SW 18-13s-20w. IP 91 BOPD, Arbuckle 3,907- 26 ft. TD 3,926 ft.

Burch Drilling Co. and Benedict Oil Association 1 Herman, SW SE NE 26-13s-20w. IP 99 BOPD, Lansing. TD 3,843 ft.

Graham County: Murfin Drilling Co. 1 Mildexter, C SW NE 6-7s-22w. IP 326 BOPD, 38°, Lansing 3,780-86 ft., 3,759-64 ft. TD 4,050 ft.

K&E Drilling Co. 1 Johnson, NW NW NW 5-9s-25w. IP 125 BOPD, 33°, Lansing, 3,981-86 ft. TD 4,046 ft.

Woodman & Iannitti 1 Drury, SE SE NW 24-9s-24w. IP 42 BOPD, 40% b.s. and w., 38°, 3,950-54 ft., 3,932-35 ft. TD 4,020 ft.

Grant County: Hugoton Production Co. 2-6 Hoffman, C SE SE 6-30s-37w. IP 9,307 M.c.f.d., Council Grove 2,751-57 ft., 2,798-2,810 ft., 2,818-28 ft., 2,841-50 ft., 2,858-63 ft., 2,866-86 ft. TD 5,909 ft.

Ness County: Barnett Oil Co. 1 Margheim, SE SE SE 17-19s-21w. IP 48 BOPD, Mississippian 4,338-47 ft., 4,374-83 ft. TD 4,390 ft.

Pratt County: Tom Palmer 1 Rollingson, NW NW SW 30-27s-12w. IP 1,608 BOPD, 38°, Simpson 4,306-25 ft. TD 4,471 ft.

Russell County: Rudy A. Herman 1 Reich, SW SW SW 28-12s-15w. IP 55 BOPD, 10% b.s. and w., 41°, Toronto 2,939-43 ft. TD 3,286 ft.

Sumner County: South Texas Development Co. 1 McIlhenny, SE SE NW 1-31s-4w. IP 58 BOPD, 6% b.s. and w., 39.1°, Kansas City 3,575-78 ft. TD 3,690 ft.

Stelbar Oil Corp. 1 Moyer, NE NE SW 12-31s-3w. IP 32 BOPD, 34% b.s. and w., 38°, Kansas City 3,344-46 ft. TD 4,317 ft.

LOUISIANA OFFSHORE

West Cameron area: J. Ray McDermott & Co. 1-A OCS-0526, Block 68 West Cameron area, Gulf of Mexico. IP 2,100 M.c.f.d., GLR 31, 25 M.c.f. per bbl., 48.2°, TP 4,950 psi., perf. 12,-800-20 ft. TD 16,106 ft. New field.

Eugene Island area: Shell Oil Co. 2 OCS-0362 (State Lease 1,595), Block 12, Atchafalaya Bay. IP 126 BOPD, 5,300 M.c.f.d., 12/64-in., 50.5°, TP 6,050 psi., perf. 12,094-12,109 ft. TD 13,000 ft. New field.

Main Pass area: Gulf Oil Corp. 6 Louisiana State "QQ" 195, Township 19s-19e, Block 47, Gulf of Mexico. IP 16 BOPD, 1,310 M.c.f.d., 10/64-in., 57.4°, TP 2,350 psi., perf. 8,454-58 ft., TD 9,000 ft. New pay and extension Main Pass Block 47 field.

Ship Shoal area: Sinclair Oil & Gas Co. 5 OCS-0440, Block 153, Gulf of Mexico. IP 174 BOPD, 250 M.c.f.d., 10/64-in., 32.3°, TP 1,400 psi., perf. 6,311-21 ft. TD 8,228 ft. New pay and extension Ship Shoal Block 154 field.

SOUTH LOUISIANA

Assumption Parish: Texas Crude Oil Co. 1 J. Aron & Co., Inc., 33-14s-14e. IP 1,900 M.c.f.d., ⅛-in., TP 3,900 psi., perf. 12,211-17 ft., and 4,800 M.c.f.d., 200 BOPD, ¼-in., 48°, TP 3,000 psi., perf. 11,955-65 ft. TD 12,309 ft. New pays in Oakley field.

Beauregard Parish: Siboney Petroleum Corp. 2 Columbia, 8-6s-13w, 2 miles northwest of Bancroft field. IP 117 BOPD, 6/64-in., 47°, GOR 1,966 cu. ft. per bbl., TP 1,350 psi., perf. 7,710-17 ft., Yegua. TD 8,134 ft. New field.

Iberville Parish: Freeport Sulphur Co. 2 A. Wilberts Sons, 60-9s-12e, 2¼ miles northeast of Bayou Plaquemines field. IP 130 BOPD, 7/64-in., 36°, GOR 464

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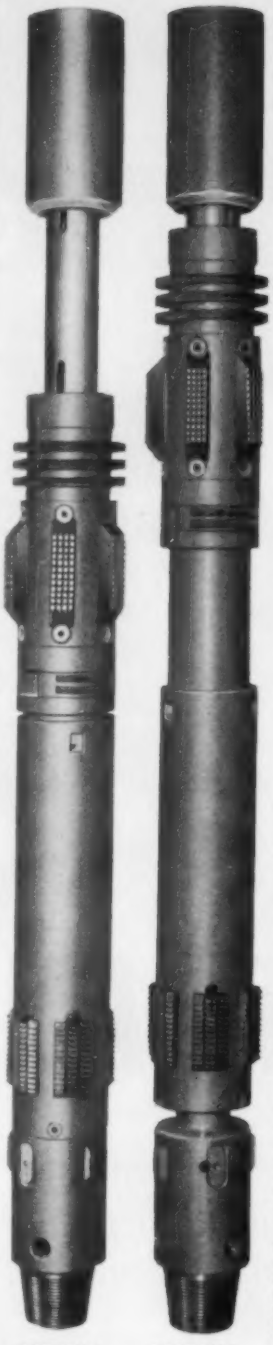

POSITION A POSITION B

...no stuck drill stem with Lebus Anchor Wash Pipe Spear

Stuck Fish is recovered and brought out in ONE TRIP with LEBUS WASH-PIPE SPEAR and WASH-OVER PIPE when bit and drill stem are stuck off or on bottom.

When fish is stuck off bottom this spear prevents it from dropping after being washed or reamed loose.

Can be located in any joint of washpipe without use of special landing collars or nipples.

This spear is anchored tong-tight inside the washpipe by the catching slips; this makes it easy to place spear in selected position.

Anchored Spear slips are released by continued right hand rotation of Washpipe after spear is connected tong-tight to the fish.

Can be used with knuckle joints, overshots, spears, short or long drill pipe stringers or other essential tools for connecting to the fish.

Spear is always operative to automatically catch fish when Washpipe is being rotated; at a stand still; being raised or lowered (to make Kelly connection or for freeing the Washpipe and reaming shoe).

Left hand rotation of the Washpipe causes the slips to reanchor for backing off any part of the washed over fish with Washpipe.

Spear operates by both hydraulic and mechanical action when fish starts to fall—either operating within 12 inches.

POSITION A
Slips in a down and retracted position; friction block cage in downward position where it will rotate with the wash pipe during the wash-over operation. Spear is also placed into wash-over pipe in this position.

POSITION B
Catching and holding position; the spear is actuated into this position by raising the wash pipe or when the drill stem drops. This catching prevents the drill stem from dropping to the bottom of the well.

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cu. ft. per bbl., TP 940 psi., perf. 10,964-72 ft. TD 13,850 ft. New field.

St. Martin Parish: Pan American Petroleum Corp. 1 Du Bernard M. T. Unit, 63-8s-6e. IP 335 BOPD, 9/64-in., 35.1°, GOR 344 cu. ft. per bbl. TP 1,250 psi., perf. 11,714-24 ft. TD 12,300 ft. New pay in Cecelia field.

Vermilion Parish: The Texas Co. 1 Lill Bernard Sonnier Unit 1, 34-11s-4e, 5 miles northeast of Erath. IP 118 BOPD, 319 M.c.f.d., 4/64 in., 40.4°, TP 8,050 psi., perf. 13,278-88 ft. TD 13,620 ft. New field.

MISSISSIPPI

Adams County: John S. and S. C. Callon 1-E U.S.A., 36-5n-1w. IP 40 BOPD, 9/64-in., 36°, TP 155 psi., perf. 6,368½-70 ft., Wilcox. TD 7,007 ft. Elev. 123 ft., Wilcox 4,608 ft., base Baker Shale 6,368 ft., Minter sand 6,694 ft. Discovery well West Deerfield field.

Clarke County: Broadhead & Stack 1 International, 30-2n-17e. IPP 81 BOPD, net, 7% water, 16.8°, perf. 3,769-79 ft., Eutaw. TD 4,005 ft. Elev. 332 ft., base Chalk 3,611 ft. Extends Junction City field.

Jones County: Central Oil Co. and Zach Brooks Drilling Co. 1 Mississippi Investments, Inc., 1-8n-12w. IP 252 BOPD, ¼-in., 27.4°, TP 120 psi., perf. 11,268-79 ft., Paluxy. TD 12,308 ft. Discovery well Laurel field.

MONTANA

Musselshell County: Miles Jackson 1 NP-McConnell, 1-8n-29e. IP 70 BOPD, 37.5°, 7,079-99 ft., 7,111-33 ft. TD 7,179 ft. New field.

Rosebud County: Honolulu Oil Corp. 11-9 Stensvad et al., 11-11n-31e. IP 448 BOPD, 33.6°, Tyler "B" sand 5,308-80 ft. TD 5,516 ft. Opens Stensvad field.

NEBRASKA

Kimball County: Hickerson and McCulloch Oil Co. et al. 1 Mockett, C SE NE 20-14n-56w. IP 224 BOPD, 6,664½-67½ ft. TD 6,740 ft. New pool.

Chandler and Simpson and Don Rounds 1 Linn, C SE NW 31-15n-54w. IP 165 BOPD, "J" sand 6,014-20 ft. TD 6,100 ft. New pool.

NEW MEXICO

Eddy County: E. P. Campbell 1 Cockerham, 24-18s-26e. IP 126 BOPD, ⅜-in. choke, 40°, TP 350 psi., Abo 5,280 ft. TD 5,637 ft., PB 5,626 ft. Originally completed dry in 1957.

Joseph I. O'Neill, Jr. 1-E Federal, 4-19s-30e. IPP 49 BOPD, 36°, GOR 129:1, Queen 3,092-3,126 ft. TD 3,339 ft., elevation 3,516 ft.

Lea County: Bishop Canyon Uranium Corp. 1-A Forest, 11-18s-38e, 1 mile northeast of Bishop-Canyon field. IPP 30 BOPD, 34°, 4,884-90 ft. TD 5,112 ft., elevation 3,663 ft.

Roosevelt County: Ohio Oil Co. 1 Federal-McGrail, 20-8s-37e, 3 miles northeast of Allison field. IP 720 BOPD, 20/64-in. choke, 47.5°, GOR 1,372:1, TP 915 psi., perforated Baugh "C" zone (Pennsylvanian), 9,490-9,510 ft. TD 12,125 ft., PB 9,605 ft., elevation 4,064 ft.

NORTH DAKOTA

Bottineau County: Cardinal-Great American 1 Emard Rice, C NW NW 26-163n-79w. IP 64 BOPD, 386 BWPD, 38°, Mission Canyon 3,158-88 ft. TD 3,305 ft. Opens discovery in Haram area.

Cardinal 1 Fylling, C NW SE 35-163n-79w. IP 8 BOPD, 16 BWPD, 37°, Mission Canyon 3,143-48 ft., 3,156-65 ft., 3,168-75 ft., 3,184,90½ ft. TD 3,519 ft. Opens field in Landa area.

OHIO

Medina County: Ohio Fuel Gas Co., East Ohio Gas Co., Wiser Oil Co. 1-A F. Smith, Lot 69, Hinckley Township, dolomite? 5,775-90 ft.. IP: 1,200 M.c.f.d. TD 7,040 ft.

EAST TEXAS

Smith County: William E. Sharp 1 Holt, C. H. Nimmon Sur., A-745, 9 miles southwest of Gladewater. Gas discovery in Wright Mountain field. IP 4,050 M.c.f. gas, GOR 15,830:1 58°, Lower Pettet 8,355-59 ft. TD 8,376 ft., elevation 433 ft. Shut-in pressure 3,048 psi.

NORTH TEXAS

Jack County: Lone Star Producing Co. 1-A Roy Cherryhomes, T. G. Box Sur, A-35, 18 miles northeast of Jacksboro. IP 136 BOPD, 20/64-in. choke, 41.6°, GOR 1,495:1, TP 470 psi., Caddo 5,776-80, 5,867-72, 5,902-10 ft. Originally completed dry. Old TD 6,862 ft., PB 5,963 ft.

Young County: Artex Oil Co. 1 Stovall, Sec. 2,925, TE&L Sur., 7 miles southwest of Newcastle. IP 112 BOPD, 18/64-in. choke, 32°, GOR 520:1, TP 195 psi. TD 4,778 ft.

SOUTHWEST TEXAS

Brooks County: The Texas Co. 19 McGill Brothers NCT-1, Section 12, San An-

These securities have not been and are not being offered to the public.
This advertisement appears as a matter of record only.

February 16, 1959

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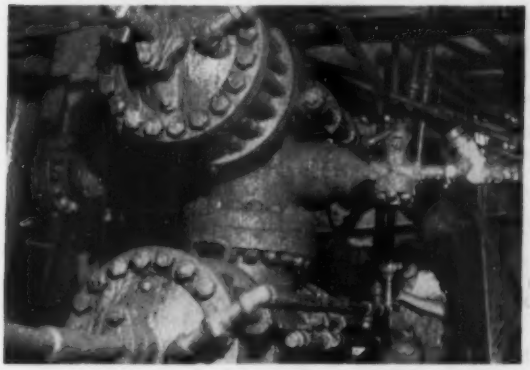

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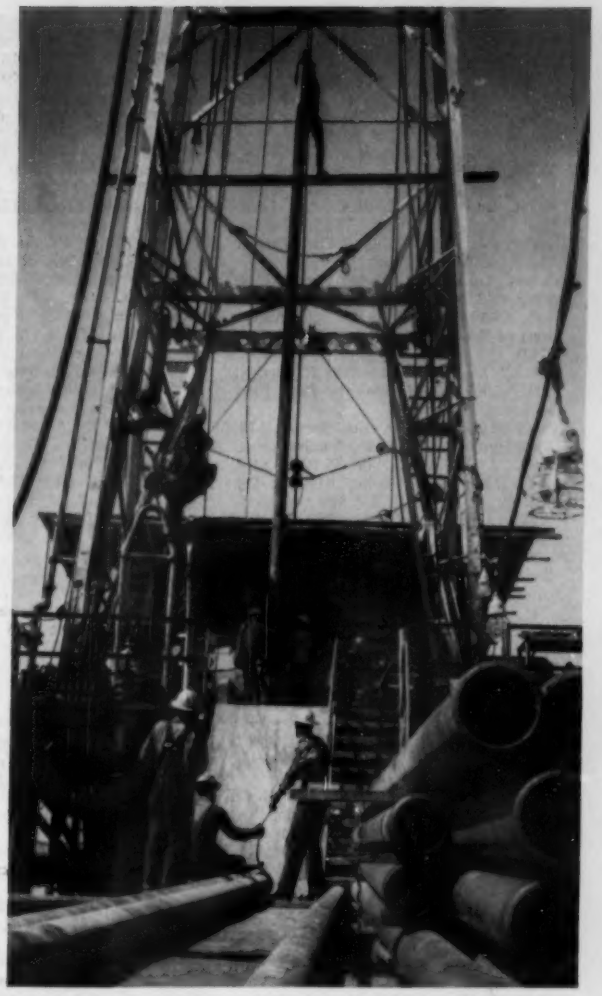

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tonio Grant, A-214. IP 184.09 BOPD, ⅛-in., 39.2°, GOR 703 cu. ft. per bbl., TP 1,100 psi., perf. 8,030-35 ft., Vicksburg. TD 11,605 ft. New field.

Duval County: Armstrong & Horn and Texam Oil Corp. 1 Isabel G. de Garcia, Section 411, Share 2, AB&M Sur., A-38, 15 miles northwest of San Diego. IP 89.56 BOPD, ⅛-in., 44°, GOR 825 cu. ft. per bbl., 485 psi., perf. 4,140-42 ft., and AOF 11 M.M.c.f.d., GLR 75.7 M.c.f. per bbl., 73.1°, shut-in. 1,650 psi., perf. 4,788-91 ft., Pettus. TD 5,182 ft. New field.

Tex-Star Oil & Gas Corp. and Hugh Fitzgerald 1 Antonio E. Garcia, Sec. 407, AB&M Sur., A-37, 10 miles northwest of San Diego. AOF 4,350 M.c.f.d., GLR 112 M.c.f. per bbl., 50°, shut-in TP 1,747 psi., perf. 4,707-18 ft., Pettus. TD 5,200 ft. New pay in East Fitzsimmons field.

Russell Maguire 1 Robinson, Section 312, Paul Henry Sur., A-1265, 5 miles northwest of San Diego. IP 75.19 BOPD, net, 15% water, ⅛-in., 41.8°, GOR 585 cu. ft. per bbl., TP 500 psi., perf. 5,813-17 ft., Yegua. TD 6,202 ft. New field.

F. William Carr 1 J. F. Welder heirs, Section 102, Samuel Alexander Sur., A-685. IP 47.56 BOPD, net, 8% water, 24°, GOR 15 cu. ft. per bbl., perf. 2,272-84 ft., lower Hockley. TD 2,632 ft. New pay in Seven Sisters field.

G. L. Rowsey et al. 1-C Archer Parr, Jr., Section 301, BS&F Sur., A-84, 5 miles west of San Diego. IP 75.70 BOPD, 10/64-in., 46.9°, GOR 2,445 cu. ft. per bbl., TP 525 psi., perf. 4,627-31 ft., Hockley. TD 6,602 ft. New pay in Cadena field.

Hidalgo County: The Texas Co. 14 Garcia Land & Livestock Co., Porcion 42, Dyonisio Zamora Sur., A-86, 11 miles northwest of Penita. IP 70.50 BOPD, 9/64-in., 40°, GOR 621 cu. ft. per bbl., TP 260 psi., perf. 3,930-34 ft., Sullivan sand. TD 4,150 ft. New pay in Bloomberg field.

Jim Wells County: Midhurst Oil Corp. 22 Paula V. de Garcia, Section 212, R. J. Kleberg Sur., A-274, 10 miles southeast of Alice. AOF 8 M.c.f.d., dry gas, shut-in. TP 1,842 psi., perf. 4,374-82 ft. TD 6,405 ft. New pay in Magnolia City field.

Tidewater Oil Co. 9-A Shaeffer Ranch, W. G and C. Boswell Sur. 4, 20 miles north of Alice. IP 129 BOPD, ⅛-in., 44.9°, GOR 676 cu. ft. per bbl., TP 800 psi., perf. 4,843-48 ft., Hockley. TD 5,670 ft. New pay in North Rowena field.

La Salle County: Sutton Production Co. 3 Cartwright, Section 201, H&GH Sur., A-298, 13 miles southeast of Cotulla. IP 109 BOPD, 10/64-in., 41°, GOR 1,060 cu. ft. per bbl., TP 420 psi., perf. 4,897-4,906 ft., Wilcox. TD 5,487 ft. New pay in West Washburn field.

Maverick County: Shell Oil Co. 1 Jack Keisling, Lot 17, Indio Farms Subd., Antonio Rives Grant, A-788 ft., 23 miles southeast of Eagle Pass. IPP 13.87 BOPD, 38°, GOR 452 cu. ft. per bbl., perf. 1,585-90 ft. TD 2,005 ft. Discovery well of El Indio field.

Starr County: Flourney Drilling Co. 1 Jose Dimas, Share 5, Los Retaches Grant, 3½ miles southwest of Santa Elena. IP 112.10 BOPD, ⅛-in., 46.1°, GOR 1,505 cu. ft. per bbl., TP 940 psi., perf. 5,620½-24½ ft. TD 5,710 ft. New pay in North Sun field.

TEXAS GULF COAST

Austin County: Shell Oil Co. 1 Zaruba et al., H&TC Sur. 1831 A-216, 4 miles west of Sealy, AOF 28 M..M.c.f.d., 12 BC per M.M.c.f., shut-in. TP 2,771 psi., perf. 8,786-8,816 ft., Wilcox, TD 5,511 ft. Extends Sealy field 1 mile west.

Bee County: Armstrong & Horn and Del Valle Oil Corp. 1 Welder, Thomas Quirk Sur., A-57, 15 miles west of Refugio, AOF 5,100 M.c.f.d., dry gas, shut-in TP 1,076 ft., perf. 4,164-70 ft., Frio-Sinton sand TD 5,520 ft. New field.

Calhoun County: Ohio Oil Co. 1 Bindewald, Jose Felix de la Fuentes Sur., A-13, ¼ mile north of Seadrift. IP 106.22 BOPD, ⅛-in., 46°, GOR 1,480 cu. ft. per bbl., TP 1,150 psi., perf. 7,865-74 ft., Frio. TD 8,478 ft. New oil reservoir in North San Antonio Bay area.

Layton Brown Drilling Co. 19 Maud B. Traylor, Juan Maldonado Sur., A-120, 9½ miles southeast of Port Lavaca. IP 100.92 BOPD, 7/64-in., 40.8°, GOR 2,267 cu. ft. per bbl., 1,920 psi., perf. 7,973-77 ft., Frio, and AOF 15 M.M.c.f.d., GLR 42.55 M.c.f. per bbl., 58.6°, perf. 7,710-14 ft., Frio, perf. 7,710-14 ft. Frio. TD 8,565 ft. New reservoirs and extension Maude B. Traylor field.

Edwin L. Cox 1-A Leonard M. Fisher Unit 1, E. Cantu Sur., A-6, 8 miles northeast of Seadrift. AOF 4,900 M.c.f.d., GLR 245 M.c.f. per bbl., 53.5°, shut-in TP 5,002 psi., perf. 8,828-31 ft. and 8,834-36 ft., Frio. TD 9,362 ft. New field.

Chambers County: Sun Oil Co. 1 State Tract 261, Galveston Bay, 14 miles southeast of Baytown. IP 185 BOPD, XX-32 choke, 36.2°, GOR 767 cu. ft. per bbl., TP 1,250 psi., perf. 9,606-12 ft., Frio. TD 10,000 ft. New pay and extension Southwest Red Fish Reef field.

Colorado County: Ginther, Warren & Co. et al. 1 Fehrenkamp, Marmaduke Baton Sur., A-105, 3 miles northeast of Rock Island. IP 113.37 BOPD, 9/64-in., 37°, GOR 1,343 cu. ft. per bl., TP 880 psi., perf. 4,970-74 ft., Cockfield. TD 10,769 ft. Second well and new pay in Ginther field.

DeWitt County: Harkins & Co. and Claud B. Hamill 1 Helen Zengerle, Patrick Quinn Sur., A-395, 2½ miles north of Anders. AOF 4,950 M.c.f.d., GLR 107.5 M.c.f. per bbl., 50.8°, shut-in TP 1,944 psi., perf. 5,228-36 ft., Yegua. TD 8,350 ft. New pay in Doehrmann field.

Holmes Drilling Co. 2 Hartman, Green DeWitt Sur., A-15, 7 miles southeast of Cuero. IP 92.18 BOPD, net 10% water, 13/64-in., GOR 1,989 cu. ft. per bbl., TP 350 psi., perf. 7,926-48 ft., Wilcox. TD 9,507 ft.

Galveston County: J. S. Michael Co. 1 Newman, S. F. Austin Sur. 4, A-2, 1 mile northwest of Hitchcock, AOF 44 M.M.c.f.d., GLR 17 M.c.f. per bbl., 47°, shut-in TP 9,335 psi., perf. 13,-282-88 ft., Frio. TD 14,155 ft. New reservoir 1 mile southwest of Northeast Hitchcock field.

Goliad County: Shoreline Petroleum Corp. 1 Edgar F. Henning, Gertrudis Barrera Sur., A-2, 2½ miles northeast of Goliad. AOF 2,650 M.c.f.d., dry gas, shut-in TP 1,312 psi., perforations 3,214-16 ft., Frio, and 3,400 M.c.f.d., dry gas, perf. 1,985-93 ft., Catahoula. TD 4,000 ft. New field.

Hardin County: Gulf States Land & Industries, Inc., 1 Carpenter et al., Section 72, HT&B Sur., A-677, 2 miles north of Sour Lake. IP 203.58 BOPD, ⅛-in., 32.9°, GOR 997 cu. ft. per bbl., TP 1,840 psi., perf. 9,189-97 ft., Yegua. TD 9,236 ft. New pay in Sour Lake field.

Harris County: The Texas Co. 1 Theresa Peterson, D. D. Culp Sur., A-811, 4 miles north of Crosby. IP 41 BOPD, 11/64-in., 36.1°, GOR 537 cu. ft. per bbl., TP 150 psi., perf. 8,016-28 ft., Yegua. TD 9,260 ft. New field—Gum-Gulley.

Slick Oil Corp., Petroleum Operators, Ltd., and J. P. Petkas 1 O'Banion Williams, John P. Cockrell Sur., A-1438, 19 miles west of Houston. IP 61.09 BOPD, ⅛-in., 32°, GOR 12 Mc.f. per bbl. TO 2,050 psi., perf. 8,030 ft. (double ring).

Jackson County: H. H. Howell, Cecil J. Cox et al. 2 H. A. Meyer Est., George Sutherland Sur., A-75, 4 miles southeast of Ganado. IP 151 BOPD, ⅛-in., 39°, GOR 700 cu. ft. per bbl., TP 1,075 psi., perf. 6,684-90 ft., Frio. TD 7,002 ft. New pay in Stewart field.

Providence Petroleum Corp. 1 Stepan, Section 44, Second Subd. Bennett Ranch, V. Garcia Grant, A-24, 2 miles southwest of LaSalle. IP 146.50 BOPD, ⅛-in., 36.8°, GOR 620 cu. ft. per bbl., TP 1,075 psi., perf. 5,974-76 ft., Frio. TD 6,515 ft. New field.

Jasper County: Gulf Oil Corp. 2 Temple et al., W. C. Frazier Sur., A-145, 8.7 miles west of Buna. IP 302.96 BOPD, 11/64-in., 42.1°, GOR 1,432 M.c.f. per bbl., TP 1,625 psi., perf. 11,-151-59 ft., Wilcox. TD 11,750 ft. New oil pay in West Buna field.

Jefferson County: North Central Oil Corp. 1-A Kountze & Stewart et al., John Leverance Sur., A-164, 3 miles south of Sabine Pass. AOF 37 M.M.c.f.d., GLR 100 M.c.f. per bbl., shut-in TP 3,320 psi., perf. 8,606-10 ft., Miocene. TD 11,500 ft. New field.

Cyprus Oil Co. 1 Tyrrell et al. Unit, W. C. Dunshil Sur., A-602, 5 miles north of Winnie. IP 128.35 BOPD, P-30 choke, 34.2°, GOR 431 cu. ft. per bbl., TP 900 psi., perf. 9,848-50 ft., Nodosaria sand. TD 9,902 ft. Second well and new pay in South Bauer Ranch field.

Kenedy County: Union Producing Co. 1 State Tract 348, Laguna Madre, 21 miles north of Port Mansfield. AOF 7,250 M.c.f.d., GLR 100 M.c.f. per bbl., 60°, shut-in TP 3,199 psi., perf. 8,275-80½ ft., Frio. TD 17,320 ft. New field—Mesquite Rincon.

Live Oak County: S. H. Howell 1 Benton Allen, George W. Sharp Sur., A-417, 17 miles southwest of George West. AOF 4,100 M.c.f.d., GLR 207 M.c.f. per bbl., 51.2°, shut-in TP 1,804 psi., perf. 4,807-11 ft., Pettus. TD 4,837 ft. New reservoir in Ramirena area.

Jefferson Lake Sulphur Co. 1 Roy Hinnant, J. R. Miller Sur., A-276, 13 miles south of George West. IP 87 BOPD, 10/64-in., 28.7°, GOR 3,680 cu. ft. per bbl., TP 1,200 psi., perf. 4,125-28 ft. TD 5,809 ft. New field.

Madison County: Woodley Petroleum Co. et al. 1 Tillie Coleman et al., Amy Boatwright Sur., A-7, 5 miles southwest of Madisonville. Shut-in gas-condensate well, no gage, perf. 9,240-50 ft. TD 9,510 ft. New field.

Matagorda County: Skelly Oil Co. 1 Jackson, Nathaniel Reed Sur., A-373, 6 miles north of Palacios. AOF 2,400 M.c.f.d., GLR 38 M.c.f. per bbl., 55.5°, shut-in TP 2,900 psi., perf. 8,868-84 ft., Frio. TD 9,800 ft. New field.

Monsanto Chemical Co. 1 Fay, Thomas Jamison Sur., A-51, ½ mile east of El Maton. IP 3,880 M.c.f.d., 139 BC per M.M.c.f.d., 52°, perf. 10,120-30 ft., and 269 BOPD, 9/64-in., 34.5°,

The January completion score

	TOTAL COMPLETIONS							WILDCATS							
	Total	Crude	Cond.	Gas	Dry	Service	Footage	Total	Crude	Cond.	Gas	Dry	Footage	C.T.	Act. op.
Alabama	17	15	0	0	2	0	180,279	2	0	0	0	2	6,959	0	16
Alaska	1	1	0	0	0	0	12,046	1	1	0	0	0	12,046	0	4
Arizona	1	0	0	0	1	0	6,520	0	0	0	0	0	0	0	0
Arkansas	96	55	0	1	40	0	343,978	23	2	0	0	21	93,927	0	96
California	156	108	0	4	44	0	727,835	38	4	0	2	32	197,397	0	113
Colorado	72	11	0	7	53	1	399,686	36	1	0	3	32	199,724	0	108
Florida	1	0	0	0	1	0	4,748	1	0	0	0	1	4,748	0	2
Illinois	234	100	0	2	98	34	501,515	40	0	0	0	40	72,748	45	389
Indiana	66	26	0	3	36	1	107,083	19	2	0	0	17	29,477	46	79
Kansas	402	181	1	21	187	12	1,431,562	102	13	0	5	84	396,228	49	350
Kentucky	150	48	0	23	72	7	246,713	12	1	0	0	11	14,107	105	178
Louisiana	352	172	35	17	125	3	2,662,689	55	3	4	3	45	470,934	0	439
North	130	64	0	12	54	0	457,873	26	1	0	3	22	143,814	0	166
South	187	91	25	5	63	3	1,861,748	28	2	3	0	23	312,810	0	230
Offshore	35	17	10	0	8	0	343,068	1	0	1	0	0	14,310	0	43
Michigan	58	13	0	9	36	0	159,762	20	2	0	1	17	58,903	37	134
Mississippi	77	35	5	0	37	0	713,807	38	6	0	0	32	345,457	0	60
Montana	28	18	0	0	10	0	136,453	7	1	0	0	6	31,535	2	55
Nebraska	59	19	0	0	40	0	344,875	26	3	0	0	23	147,411	0	44
New Mexico	146	96	3	23	24	0	623,161	18	3	0	0	15	104,434	39	174
Nevada	1	0	0	0	1	0	2,600	1	0	0	0	1	2,600	0	0
New York	20	12	0	0	1	7	28,005	1	0	0	0	1	3,433	20	15
North Dakota	39	28	0	0	11	0	252,505	9	5	0	0	4	49,920	0	44
Ohio	66	32	0	19	14	1	185,246	2	1	0	0	1	8,667	64	187
Oklahoma	495	246	9	33	200	7	1,908,004	93	14	0	5	74	426,389	104	788
Pennsylvania	59	15	0	31	7	6	177,166	1	0	0	0	1	2,550	58	41
South Dakota	3	1	0	0	2	0	10,834	2	0	0	0	2	2,177	0	2
Tennessee	2	0	0	0	2	0	1,155	2	0	0	0	2	1,155	2	3
Texas	1,871	1,014	71	71	689	26	7,803,239	371	24	9	5	333	1,908,043	91	1,225
Dist. 1	157	97	1	6	53	0	338,620	36	0	0	1	35	123,208	0	35
Dist. 2	80	17	14	13	36	0	473,519	24	3	1	1	19	156,194	0	50
Dist. 3	104	37	12	4	51	0	757,625	32	2	3	1	26	286,586	0	121
Dist. 4	148	39	15	14	77	3	723,072	45	7	3	1	34	267,707	6	89
East	109	50	12	1	46	0	542,016	28	1	0	0	27	143,018	0	53
Dist. 7-B	236	91	1	2	140	2	679,414	72	1	0	0	71	248,355	20	101
West	576	431	5	6	125	9	2,754,826	68	5	0	0	63	377,975	34	535
Dist. 9	334	168	2	14	138	12	981,566	55	4	0	1	50	227,794	31	114
Dist. 10	127	84	9	11	23	0	552,581	11	1	2	0	8	77,206	0	127
Utah	33	21	0	0	12	0	182,756	8	0	0	0	8	44,656	0	47
Washington	1	0	0	0	1	0	8,015	1	0	0	0	1	8,015	0	0
West Virginia	68	13	0	38	10	7	174,727	2	0	0	2	0	11,355	68	191
Wyoming	80	23	0	12	45	0	387,801	32	2	0	5	25	198,576	12	146
Jan. 1959	**4,654**	**2,303**	**124**	**314**	**1,801**	**112**	**19,724,765**	**963**	**88**	**13**	**31**	**831**	**4,853,571**	**742**	**4,930**
Jan. 1958	4,988	2,456	116	362	1,957	97	21,102,651	1,067	87	13	48	919	5,038,191	....	....

D.D. = 15: Ill. 8, Colo. 1, Okla. 5, Texas (1) 1.

. . . and in Western Canada

	ALL WELLS					WILDCATS				
	Total	Oil	Gas	Dry	Footage	Total	Oil	Gas	Dry	Footage
Alberta	111	64	8	39	612,716	31	3	3	25	170,121
Saskatchewan	55	35	0	20	254,922	17	2	0	15	82,662
Manitoba	3	2	0	1	8,962	1	0	0	1	3,790
British Columbia	8	2	1	5	38,119	7	1	1	5	34,337
Western Canada	**177**	**103**	**9**	**65**	**914,719**	**56**	**6**	**4**	**46**	**290,910**

GOR 1,045 cu. ft. per bbl., TP 1,800 psi., perf. 10,036-43 ft. TD 11,520 ft. New field.

Roy R. Gardner and Ralph Lowe 1 Beverson et al., Section 33, Texas Rice Development Co. Subd., Susan Perkins Sur., A-371, 3 miles north of Palacios. AOF 17,500 M.c.f.d., GLR 38.8 M.c.f. per bbl., 54.7°, shut-in TP 3,379 psi., perf. 9,018-26 ft., Frio-Melbourne sand. TD 9,109 ft. New field.

Magnolia Petroleum Co. 1 Scarbrough, Section 41, J. C. Hall League, 2 miles northeast of Collegport. Dually completed gas-condensate well, shut-in, no gage. TD 10,999 ft. New field.

E. Cockrell, Jr., 2 Northern Ranch, William A. Hurd Sur., A-196, 7 miles north of Markham. IP 176 BOPD, 9/64-in., 34.9°, GOR 581 cu. ft. per bbl., TP 945 psi., perf. 7,114-16 ft. TD 8,755 ft. Discovery well Northern Ranch field.

C. B. Webster et al., 1 Hadley, J. Tilley Sur., A-93, 1½ miles east of Blessing. Shut-in gas-condensate well, no gage, perf. 10,270-10,350 ft., Frio. TD 10,916 ft. New pay in Tidehaven field.

Nueces County: Petroleum, Inc., et al., 1 Keiko Groeneveld, Section 39, Richard King Farm Lots, 5 miles west of Banquete. AOF 14,500 M.c.f.d., GLR 85.8 M.c.f. per bbl., 60.4°, shut-in TP 1,884 psi., perf. 5,858-62 ft., Frio. TD 6,005 ft. Discovery well Groeneveld field.

Northern Pump Co. 1 Clara Driscoll Est., Tract 1, G. H. Paul Subd., Driscoll Ranch, 1 mile northeast of Robstown. IP 25 BOPD, net, 2% water, 10/64-in., 40°, GOR 1 M.c.f. per bbl., TP 200 psi., perf. 5,973-79 ft., Frio. TD 6,015 ft. New pay in East Robstown field.

Polk County: Oil Reserves Corp. 5 Carter-Quinn, A. Morales Sur., A-52, 3 miles southeast of Segno. IP 11.04 BOPD, 16/64-in., 39.8°, TP 50 psi., perf. 5,275-81 ft., Yegua. TD 6,600 ft. New pay in Segno field.

Refugio County: Bill I. Burch, George K.

January 1959 footage analysis

	Field wells					Wildcats			
	Oil	Cond.	Gas	Dry	Service	Oil	Cond.	Gas	Dry
Alabama	173,320	.....	.....	.....	.....	.....	.....	.....	6,959
Alaska	.....	.....	.....	.....	.....	12,046	.....	.....	.....
Arizona	.....	.....	.....	6,500	.....	.....	.....	.....	.....
Arkansas	176,973	.....	4,308	68,770	.....	8,887	.....	.....	85,040
California	450,752	.....	12,125	67,561	.....	30,434	.....	11,420	155,543
Colorado	58,182	.....	22,132	114,211	5,437	5,272	.....	19,754	174,698
Florida	.....	.....	.....	.....	.....	.....	.....	.....	4,748
Illinois	237,540	.....	1,849	138,808	50,570	.....	.....	.....	72,748
Indiana	38,357	.....	2,713	33,616	2,920	3,112	.....	.....	26,365
Kansas	560,880	5,725	57,677	373,814	37,238	48,210	.....	29,824	318,194
Kentucky	57,818	.....	68,869	96,695	9,224	1,925	.....	.....	12,182
Louisiana	1,126,213	364,133	90,521	592,318	18,570	32,563	51,318	26,850	360,203
North	139,581	.....	52,634	121,844	.....	7,943	.....	26,850	109,021
South	833,135	261,383	37,887	397,963	18,570	24,620	37,008	.....	251,182
Offshore	153,497	102,750	.....	72,511	.....	.....	14,310	.....	.....
Michigan	23,899	.....	16,500	60,460	.....	5,000	.....	3,840	50,063
Mississippi	286,842	42,991	.....	38,517	.....	52,504	.....	.....	292,953
Montana	86,818	.....	.....	18,100	.....	5,516	.....	.....	26,019
Nebraska	92,561	.....	.....	104,903	.....	17,045	.....	.....	130,366
New Mexico	368,099	19,457	95,622	35,549	.....	20,761	.....	.....	83,673
Nevada	.....	.....	.....	.....	.....	.....	.....	.....	2,600
New York	15,252	.....	.....	.....	9,320	.....	.....	.....	3,433
North Dakota	158,222	.....	.....	44,363	.....	29,189	.....	.....	20,731
Ohio	95,548	.....	44,812	33,228	2,991	3,742	.....	.....	4,925
Oklahoma	798,660	66,516	155,193	450,264	10,982	83,271	.....	36,192	306,926
Pennsylvania	28,705	.....	117,557	16,650	11,704	.....	.....	.....	2,550
South Dakota	8,657	.....	.....	.....	.....	.....	.....	.....	2,177
Tennessee	.....	.....	.....	.....	.....	.....	.....	.....	1,155
Texas	3,755,259	476,206	299,377	1,311,792	52,562	165,883	88,534	26,347	1,627,279
Dist. 1	159,371	7,750	11,276	37,015	.....	.....	.....	3,389	119,819
Dist. 2	56,859	100,839	55,160	104,467	.....	24,129	8,830	4,510	118,725
Dist. 3	211,831	82,346	27,017	149,845	.....	20,780	30,708	9,020	226,078
Dist. 4	133,914	87,810	41,887	188,158	3,596	49,816	28,554	3,515	185,822
East	226,198	72,187	6,050	94,563	.....	5,201	.....	.....	137,817
Dist. 7-B	248,754	3,315	4,814	170,915	3,261	2,540	.....	.....	245,815
West	2,004,588	53,990	36,779	264,678	16,816	42,888	.....	.....	335,087
Dist. 9	403,725	11,868	74,664	234,626	28,889	11,874	.....	5,913	210,007
Dist. 10	310,019	56,101	41,730	67,525	.....	8,655	20,442	.....	48,109
Utah	119,310	.....	.....	18,790	.....	.....	.....	.....	44,656
Washington	.....	.....	.....	.....	.....	.....	.....	.....	8,015
West Virginia	26,403	.....	94,295	24,506	18,168	.....	.....	11,355	.....
Wyoming	92,754	.....	27,369	69,102	.....	16,043	.....	45,908	136,625
Total United States	**8,837,024**	**975,028**	**1,110,919**	**3,718,537**	**229,686**	**541,403**	**139,852**	**211,490**	**3,960,826**
Western Canada	501,390	.....	26,197	96,222	.....	36,951	.....	42,719	211,240
Alberta	341,390	.....	26,197	75,008	.....	23,713	.....	37,049	109,359
Saskatchewan	151,046	.....	.....	21,214	.....	9,447	.....	.....	73,215
Manitoba	5,172	.....	.....	.....	.....	.....	.....	.....	3,790
British Columbia	3,782	.....	.....	.....	.....	3,791	.....	5,670	24,876

Taggert, Jr., et al. 1 Rooke, Section 20, LaRosa Ranch Subd. "C," 6½ miles south of Woodsboro. AOF 13,800 M.c.f.d., GLR 69.4 M.c.f. per bbl., 58.6°, shut-in TP 2,383 psi., perf. 6,314-19 ft., Frio. TD 6,500 ft. New field.

San Patricio County: C. C. Winn, Thomas Brothers, and H. J. Shearer 1 Bess McFall-Timon, San Patricio de Hibernia Town Tract, 5 miles northwest of Edroy. IP 101 BOPD, 11/64-in., 38.9°, GOR 150 cu. ft. per bbl., TP 110 psi., perf. 5,341-56 ft. New pay and extension Hibernia field.

Jake L. Hamon 1-C Hart, Block 3, Day Land & Cattle Co. Sur., A-388, 4 miles southeast of San Patricio. AOF 6 M.M.c.f.d., GLR 36.4 M.c.f. per bbl., 63°, shut-in TP 2,620 psi., perf. 6,394-6,406 ft., Frio. TD 7,745 ft. New pay in East Riverside field.

Victoria County: Harkins & Co. et al. 1 West, Felipe Dimmitt Sur., A-20, 3 miles northwest of Nursery. AOF 29 M.M.c.f.d., GLR 42.59 M.c.f. per bbl., 56.4°, shut-in TP 2,450 psi., perf. 5,683-88 ft. Yegua. TD 9,520 ft. New pay in Kyle field.

Wharton County: Acco Oil & Gas Co. 2 Pryor, W. Robertson Sur., A-55, 5 miles north of New Taiton. Shut-in gas well, no gage, perf. 6,686-92 ft., Yegua. TD 7,400 ft. New field—1¼ miles northwest of New Taiton field.

WEST TEXAS

Coke County: Sun Oil Co. 1-B Foster S. Price, Sec. 323, Blk. 1-A, H&TC Sur., 12 miles northwest of Robert Lee. IP 46 bbl. oil in 22 hr., ¼-in. choke, 47°, GOR 2,150:1, TP 125 psi., Pennsylvanian 6,408-20 ft. TD 6,680 ft. Elevation 2,079 ft.

Ector County: Slick Oil Corp., Brown & Spice 1 A. B. Connell, Sec. 8, Blk. B-16, PSL Sur., 4 miles southwest of Penwell. Dual completion. IP 605 BOPD, 32/64-in. choke, 41°, GOR 400:1, TP 260 psi., Ellenburger 9,190-9,210 ft. IP 262 BOPD, 10/64-in. choke, 35.5°, GOR 400:1, TP 650 psi., Glorieta 4,570-90 ft. TD 9,254 ft. Ground elevation 2,858 ft.

Loving County: Hill & Meeker, F. W. Holbrook 1 Wendell Trower, Sec. 4, Blk. 54, T1, T&P Sur., 17 miles north of Mentone. IP 109 BOPD, 14/64-in. choke, 41°, TP 300 psi., GOR 575:1, Delaware 4,540-46 ft. TD 4,674 ft. Elevation 3,121 ft.

Midland County: Tex-Harvey Oil Co. 6-14 Mrs. B. W. Floyd "B," Sec. 14, Blk. 37, T3S, T&P Sur., 18 miles southeast of Midland, in Spraberry Trend field. IP 120 BOPD, 24/64-in. choke, 43°, GOR 2,948:1, TP 350 psi., Pennsylvanian 10,267-10,438 ft. TD 10,438 ft. Recompletion.

Terrell County: Continental Oil Co. 1 Brown-Bassett, Sec. 227, Blk. 4, TCRR Sur., 23 miles south of Sheffield, northwest extension in Brown-Bassett gas field. IP 17,862 M.c.f. gas, calculated open-flow, Silurian 12,604-14 ft.; IP 28,750 M.c.f. gas, Ellenburger, top of pay 13,924 ft. TD 14,698 ft. Elevation 2,472 ft. Electric log tops: Strawn 11,570 ft., Devonian 12,100 ft., Silurian 12,524 ft., Ellenburger 13,910 ft.

(Continued on page 211)

AIME Oil Chief Is Well Suited

. . . as head of Society of Petroleum Engineers. Humble's top West Coast man has a wide oil-country background.

JOHN S. BELL, new president of the Society of Petroleum Engineers of the AIME, brings to the position experience in virtually every major oil patch in the country.

If there were such a thing as a composite oil man of the domestic industry, Bell would very nearly fit the mold.

In a sentence, he's a Texan, educated in New Mexico and Oklahoma, who got his oil-field start in Louisiana and now heads a major company's California operations.

A background like that should prove invaluable to the programs and goals of the Society of Petroleum Engineers. As newly inaugurated president, he plans to make an effort to visit all 42 local chapters in this country and Venezuela during 1959.

Bell has done a great job for Humble Oil & Refining Co. in California. He went west in 1950 as district superintendent shortly after Humble opened operations in the Golden State and played a major role in building up Humble's production in California from nothing in 1949 to 12,000 bbl. daily today.

Two years after arriving in California, Humble made Bell area assistant manager, and in 1955 he took over as area manager. Under his direction,

John S. Bell
. . . local chapters can expect a visit.

Humble has also been a leader in offshore work on the Pacific Coast in joint operations with Monterey Oil Co. and Standard Oil Co. of California.

A Standard of California-Humble joint venture recently paid off with a discovery of major significance on a 5,500-acre offshore lease at Summerland in Santa Barbara County. The state lease, which went to the two companies for a joint cash-bonus bid of $7,250,000, is being developed from the state's first and only permanent offshore drilling platform.

Early career . . . Bell was born in Fort Worth and attended elementary and high school in Texas.

He followed this with a stint at New Mexico Military Institute. He received his B.S. degree in petroleum engineering from the University of Oklahoma in 1930.

He joined Humble as a rotary helper in Roanoke, La., in 1933. Later he was made a junior petroleum engineer and worked his way up to district engineer. In 1938 he was named division petroleum engineer. Prior to going to California in 1950, he served as division petroleum engineer in both North and East Texas.

Bell is a 20-year member of the AIME. He has held a variety of offices in the organization including chairman of the East Texas section in 1944, chairman of the production-engineering committee in 1946, member of the petroleum branch executive committee in 1951-53; member of the council of the California chapter in 1953-55; member of the branch advertising committee; and chairman of the nominating committee in 1955.

In addition to his AIME affiliation, Bell is also a member of both the API and AAPG. He is a Mason and Shriner and active in the Boy Scouts and Christian Church in Arcadia, Calif., where he lives with his wife and son.

▶ ▶ ▶ Personals

Neal Neece, Jr., Lone Star Gas Co.'s Oklahoma City district geologist, has been named senior geologist in Dallas.

Chester E. Adams, senior research associate at the Whiting, Ind., research laboratories of Standard Oil Co. (Ind.), **David W. Bransky,** research associate, and **Kenyon A. Hyle,** project chemist, will retire March 1.

D. W. (Robby) Robertson, who recently resigned as vice president of Don Johnston Drilling Co., Denver, has been named Rocky Mountain representative of Western Drilling Co., Inc., Lubbock, Tex.

Walter A. Locker, Jr., staff assistant to Sohio Petroleum Co.'s Mid-Continent division exploration manager, has been promoted to district geologist in Midland, Tex. He succeeds **John H. Weems,** who has been transferred to the Mid-Continent division office in Oklahoma City as staff geologist.

W. Doyle Miller, consulting engineer, has been elected president of C. G. Glasscock-Tidelands Oil Co. He will also head G. C. Glasscock Drilling Co., and Consolidated Ship Yard, Inc., subsidiary companies. Miller was with Creole Petroleum Corp. in Venezuela at one time. He was vice president in charge of operations for Dresser Industries before becoming a consultant in 1957.

H. W. Collins, manager of marine properties for Aurora Gasoline Co. and vice president and manager of Michigan Tankers, Inc., an Aurora subsidiary, has been named head of Aurora's crude-oil supply, procurement and transportation, and pipeline operations.

Karl F. Hagemeier has been promoted to vice president in charge of Gulf Coast operations for Texas Crude Oil Co. **Charles Weiner,** formerly in charge of this area, has moved to Midland, Tex., in charge of exploration there.

J. C. Posgate, assistant eastern division superintendent for Humble Oil & Refining Co. in New Orleans, has been promoted to assistant manager of the crude-oil department. He will headquarter in Houston.

Dean A. McGee, president of Kerr-McGee Oil Industries, Inc., has been elected a director of Oklahoma Natural Gas Co. He succeeds the late William S. Key.

▶▶▶ Personals

MOORE

Fred H. Moore, general manager of world-wide producing operations for Socony Mobil Oil Co., Inc., has been named executive vice president and a director of Magnolia Petroleum Co. **Henry L. Waszkowski** has been named vice president, exploration and production, in the Mobil Oil division of Socony Mobil. The Mobil Oil division will handle Socony's operations in the U. S. and Canada. Both appointments are effective March 1. Moore had held his position with Socony in New York for the past year. He was executive vice president and general manager of Mobil Oil of Canada before that time. Moore joined Magnolia in 1935. He was manager of crude-oil purchases and sales and assistant to the president before assignment to Mobil Oil of Canada in 1956.

Arthur K. O'Keefe, of United States Rubber Co., has been elected president of Texas-U.S. Chemical Co., subsidiary of U.S. Rubber and The Texas Co.

John M. Brown, former manager of American Oil Co.'s El Dorado, Ark, refinery, has joined Lake Superior Refining Co., Superior, Wis., as refinery manager. Lake Superior is a subsidiary of Murphy Corp. Brown joined Root Petroleum Co., predecessor of American Oil, in 1925. He became assistant manager of American's El Dorado refinery in 1955 and manager in 1956. He retired from American last month.

Paul M. Toce has been named geologist in the Lafayette, La., office of Southwest Gas Producing Co., Inc.

James E. Beavers, superintendent of Arkansas Fuel Oil Corp.'s Greggton, Tex., plant, has been named superintendent of the May gasoline plant which will be built near Kingsville, Tex. Beavers will work on the construction program at the plant until completion, which is scheduled for October. **Owen Jenkins,** assistant superintendent at the Carthage, Tex., plant, will succeed Beavers in Greggton. **Clint W. Teller,** plant foreman at the Greggton plant, has been transferred to Carthage in the same capacity. **Homer B. Brown** will continue as field foreman at Greggton and will assist Jenkins in plant operations.

Norman Winkle, who joined Jocelyn-Varn Oil Co. last month in Wichita, has been put in charge of the company's new Oklahoma City office. **B. C. Wilson** will supervise drilling and production.

Dr. Raymond C. Moore, University of Kansas and Kansas Geological Survey, will receive the Sidney Powers Medal at next month's joint annual meeting of American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists in Dallas. The Powers Medal is AAPG's highest award. **James W. Gwinn,** Standard-Vacuum Oil Co., will receive the AAPG Matson award for the best paper presented at last year's annual meeting. **John M. Andarichuk,** Calgary, is winner of the President's award for the best professional paper published in the AAPG Bulletin during the past year. Seven geologists will be given honorary membership in AAPG. They are **Arthur E. Brainerd,** Denver; **Frank R. Clark,** Tulsa; **Charles L. Severy,** Palo Alto, Calif.; **William C. Spooner,** Shreveport, La.; **W. Taylor Thom,** Princeton University; **Arthur C. Trowbridge,** State University of Iowa; and **Everett Carpenter,** Porter Oil & Gas Co., Oklahoma City. **Henryk B. Stenzel,** consultant for Shell Development Co., Houston, will be given an honorary membership in SEPM. Other SEPM awards will go to **Patrick H. Monoghan,** Humble Oil & Refining Co., Houston, for the best paper presented at last year's annual meeting, and to **Helen Tappen,** UCLA, and **Alfred Loeblich** of California Research Corp. for the best paper published during the past year in the Journal of Paleontology. **Raymond Siever,** Harvard University, will receive an award for the best paper published in Journal of Sedimentary Petrology.

Gordon D. Kirk, process engineer for D-X Sunray Oil Co., has been promoted to senior process engineer. **A. Ebrahimi,** junior process engineer, moves up to process engineer.

Olin Bell, Wayne Bowman, George Sawtelle, and **Albert Wolf** have been given honorary membership in the Houston Geological Society. The group had previously granted honorary membership to six men and one woman. Membership recognizes outstanding contributions to the profession and to the community. Bell is a recently retired senior staff geologist for Humble Oil & Refining Co. Bowman and Sawtelle are consultants, and Wolf is retired vice president and manager of Texas Gulf Sulphur Co.'s exploration department.

Humble Oil & Refining Co. has expanded and reorganized its exploration department to place administrative authority closer to field operations. Six division geologists have been promoted to division exploration managers as part of the decentralization program. Those holding the new titles are **R. W. Bybee,** western division, Midland; **T. F. Petty,** North Texas, Wichita Falls; **J. L. Patton,** East Texas, Tyler; **O. W. Noland,** Southwest Texas, Corpus Christi; **P. H. O'Bannon,** Gulf Coast, Houston; and **E. A. Murchison,** eastern division, New Orleans. **C. S. Fleischmann,** formerly chief of the seismic section in Houston, was named assistant western division exploration manager. **O. D. Brooks,** formerly assistant to Fleischmann, was named assistant eastern division exploration manager. The following were named division geologists: **C. D. Jones,** western; **F. D. Richardson,** North Texas; **J. C. Meacham,** East Texas; **W. S. Launey,** Southwest Texas; **B. R. Payne,** Gulf Coast; and **G. L. Tate,** eastern.

PELICAN

Thomas L. Pelican, head of Colorado Interstate Gas Co.'s industrial-engineering department since 1953, has been elected vice president for engineering. Pelican was with Natural Gas Pipeline Co. of America and Texoma Natural Gas Co. before joining Colorado Interstate in 1948. **Peter J. King, Jr.,** administrative assistant to the president of Colorado Interstate, has been elected vice president for corporate and financial matters. **John J. Yeonopolus,** director of budget and rates, has been named treasurer, succeeding **William B. Kice,** who has retired.

Dean Walling, executive vice president of Western Geophysical Co., Los Angeles, has moved up to president. He succeeds **Henry Salvatorio,** who becomes chairman of the board.

J. H. Kirby has been appointed managing director of Shell Tankers, Ltd. He replaces **A. S. C. Hulton,** who is moving to another post in the Royal Dutch-Shell Group. **A. Logan** has been named deputy managing director of the tanker company.

Clifford E. Oman, assistant plant manager, has moved up to general manager of U. S. Industrial Chemicals Co.'s Tuscola, Ill., petrochemical plant. Oman joined the company, a division of National Distillers & Chemical Corp., in 1951. He is a graduate of the University of Minnesota.

Jack O. McCall, vice president of Louisiana Land & Exploration Co., has been elected president of the New Orleans Petroleum Club. **H. C. Petersen,** president of Freeport Oil Co., is the outgoing president. Other officers are **R. G. Bryan,** Union Producing Co., vice president; **H. T. Shalett,** Berkshire Oil Co., treasurer; and **Basil Moss,** Magnolia Petroleum Co., secretary. Newly elected board members include **Thomas C. Nugent,** The California Co.; **J. Frank Keller,** J. Ray McDermott & Co.; **Harry X. Bay,** The Texas Co.; and **Edel F. Blanks,** Olin Gas Transmission Co.

Herbert H. Moor, manager of the Halifax refinery of Imperial Oil, Ltd., has been named deputy management development counsellor and transferred to Toronto. **Murdo MacLeod,** plant superintendent at Halifax, moves up to refinery manager, succeeding Moor. **Maurice E. O'Loughlin,** formerly technical superintendent at the company's Edmonton refinery, will succeed MacLeod as Halifax plant superintendent.

Zeb Wesolowski has been promoted to principal staff engineer in the general engineering department of Standard Oil Co. (Ind.) at Whiting, Ind. He was formerly in the contracts division.

Officers have been appointed in Tennessee Gas Transmission Co.'s new operating divisions. Presidents of the three companies were named last month. Five vice presidents have been named in Tennessee Gas Pipeline Co., the pipeline division. They are **L. W. A. Campbell,** vice president in charge of engineering; **T. K. Davis,** compressor, gas control, and measurement operations vice president; **J. L. Parrish,** pipeline construction, research, radio, and corrosion prevention; **O. H. Simonds, Jr.,** supervising sales and planning; and **B. J. Whitley,** in charge of pipeline operation, maintenance, and right-of-way.

Officers of Tennessee Gas & Oil Co., the exploration and production division, include **S. C. Oliphant** and **W. E. Scott,** senior vice presidents. Oliphant will direct overseas operations, Scott is in charge of U.S. and Canadian operations. **J. Spencer Collins** has been named vice president heading the Houston exploration group. **S. P. King** will be vice president assisting Oliphant in foreign operations. **O. W. Ward,** vice president, will head the Canadian operating division. **A. R. West,** vice president, will supervise the Houston production group.

Three vice presidents have been named in Bay Petroleum Co., manufacturing and marketing division. **L. L. Leabo** will be vice president in charge of marketing. **George H. Meason** is vice president in charge of refining. **K. G. Pearce** will be vice president supervising natural gas processing and LPG production.

▶▶▶ Personals

J. C. Magner, assistant vice president of Rowan Drilling Co., Inc., in Fort Worth, has been elected vice president.

C. B. Wentz, assistant general manager of Continental Oil Co.'s southern region, has been promoted to director of organizational planning. Wentz joined Conoco in 1938. He was chief proration engineer in Houston and manager of the coordinating and planning department before being named assistant general manager of the southern region.

J. B. Webb, manager of production and exploration for Canadian Oil Companies, Ltd., has been elected chairman of Canadian Petroleum Association's Alberta division. He succeeds **E. C. Babson,** Union Oil Co. **C. S. Lee,** Western Decalta Petroleum, Ltd., has been named first vice chairman, and **A. O. Detmar,** Mobil Oil of Canada, Ltd., second vice chairman. Directors elected to 2-year terms include Babson; Lee; Webb; **A. E. Feldmeyer,** Canadian Superior Oil of California, Ltd.; **G. H. Galloway,** Pan American Petroleum Corp.; **Charles Hay,** Royalite Oil Co., Ltd.; **W. C. Howells,** Texaco Canada, Ltd.; **L. W. Lee,** Canadian Husky Oil, Ltd.; **T. Nitescu,** Canadian Fina Oil, Ltd.; **C. R. Spencer,** General Petroleums of Canada, Ltd.; **J. G. Spratt,** Triad Oil Co., Ltd.; and **Sam Stewart,** Richfield Oil Corp.

▶▶▶ Deaths

Joseph Taylor Fly, 67, retired director and counsel for Creole Petroleum Corp., died February 13 at his home in New York. Fly was with Continental Mexican Petroleum Co. in the 1920's. He was a vice president of Standard Oil Co. of Argentina before assignment in New York with Standard Oil Co. (N. J.). He joined Creole in 1944 and retired 3 years ago.

Joe W. Brown, 61, Louisiana independent producer, died February 15 in New Orleans. Brown also had extensive holdings in Nevada, Montana, and Texas.

Robert Wallace McIlvain, 84, retired vice president of Pure Oil Co., died February 16 at his farm in Lexington, Ky. McIlvain joined a predecessor of Pure in 1914. He retired in 1947.

Hugh W. Walker, Jr., 71, retired president of Beverly Oil Co. of Los Angeles, died February 12 in a Los Angeles hospital.

Frank G. Cannon, 70, president of Cannon Diamond Drilling Co., died recently in Los Angeles.

H. T. Goss, 58, vice president of Arkansas Fuel Oil Corp. and Arkansas Pipeline Corp., died February 10 in Shreveport, La., after a heart attack. Goss joined the Empire group of companies in 1922 after graduation from Texas A & M College. He was natural-gas engineer with Cities Service Gas Co. before moving to Arkansas Fuel Oil.

Russell H. Young, 73, retired Dexter, Kans., drilling contractor, died recently in Dexter. Young had operations in both Kansas and Oklahoma.

William Ash Waid, 83, former inspector of oil and gas leases for the Osage Indian Nation, died February 13 in a Tulsa convalescent home. Waid retired from the Indian Agency at Pawhuska, Okla., in 1940. He had been inspector for the Osage since 1915 and was known by oil men as "oil czar of the Osage Nation" during this period.

Gas prices are growth factors

BY JOHN C. CASPER

NATURAL-GAS price trends have promoted both production and consumption of this premium fuel in recent years. Marketed production of natural gas reached 11 trillion cubic feet in 1958 or five times the total for 1936. Domestic demand for petroleum products was only three times the 1936 total.

A large part of the extra growth by natural gas can be attributed to reduction in transportation costs. The savings came with the development and use of large-diameter pipelines, making it possible to move gas to new areas in the northeastern quarter of the country.

Producers are getting better prices for some of their gas. The chart on wellhead prices shows a steady decline in true-value prices until 1949. This was followed by a definite shift toward higher prices with very sharp gains from 1951 through 1954. Since 1954, the gains have been less spectacular, but the general trend has been upward.

The higher averages for recent years have been due to better prices on contracts for new gas with an assist from renegotiated prices on some of the old contracts.

The end results has been better prices for producers, particularly those with new gas. These higher prices have made it possible for gas to contribute a little more toward the cost of finding and developing petroleum reserves. However, on an energy basis, gas at 20 cents per M.c.f. is selling for only 36% of the normal crude price, now pegged at about $3.00 a barrel.

At the other end of the gas-distribution system, consumers are paying less for gas in true-value dollars than they did in the thirties. This drop shows clearly if comparisons are made for the same type of consumers in an area that has not changed too much in character.

The chart of prices paid by residential customers shows that gas users in Illinois, Indiana, and Michigan were paying $1.24 per M.c.f. in current dollars back in 1936. This rate amounts to $2.09 per M.c.f. in 1947-49 dollars. The average for 1957 was $1.20 per M.c.f. in current dollars or $0.81 in 1947-49 dollars.

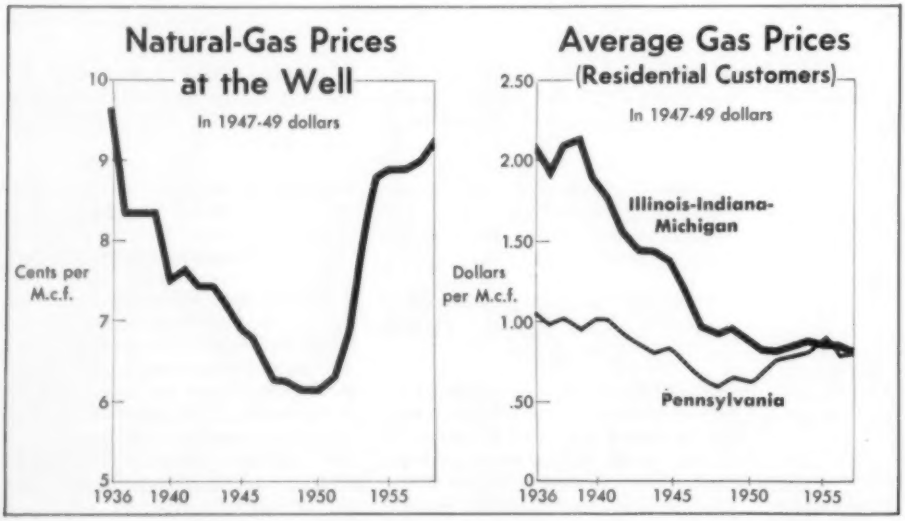
Price changes in these states are typical for an area that had a well-developed distribution system back in the thirties with gradual additions to capacity over the years.

Gas-distribution systems for some eastern areas have been developed in recent years, and the large capital expenditures still show up in gas rates. For example, Pennsylvania prices increased in the 1948-55 period even after correction for inflation.

However, these samples show that gas is a much better bargain than it was 20 years ago. And, rates will be even lower when the large gas companies can solve the seasonal demand problem without depending entirely on off-season industrial sales at low prices. Industrial sales still account for about 65% of all natural gas, but the portion is down from the 78% reported for 1936.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,167,913	DOWN	52,391	UP	350,442
Crude stocks	257,238,000	DOWN	2,432,000	DOWN	21,744,000
Completions	899	UP	47	UP	71
Refinery runs	7,954,000	DOWN	71,000	UP	434,000
Gasoline stocks	200,120,000	UP	1,212,000	DOWN	10,440,000
Kerosine stocks	19,953,000	DOWN	696,000	DOWN	534,000
Distillate stocks	88,255,000	DOWN	3,763,000	DOWN	20,162,000
Residual stocks	55,646,000	DOWN	178,000	DOWN	1,488,000
Four-product stocks	363,974,000	DOWN	3,425,000	DOWN	32,624,000
Total imports	1,848,500	DOWN	42,200	DOWN	49,000



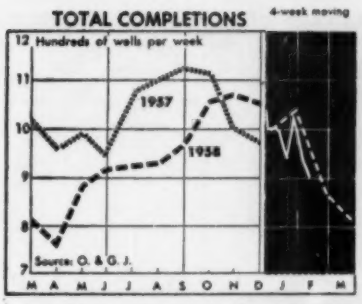
RELATIVE changes in gas prices have promoted gas sales in recent years by permitting large percentage gains in payments to producers with small percentage gains in consumer prices. The charts show gas prices, corrected for inflation by price indexes of the Department of Labor. Prices at the well are corrected according to changes in the Wholesale Price Index. Consumer price adjustments are based on the Consumer Price Index.

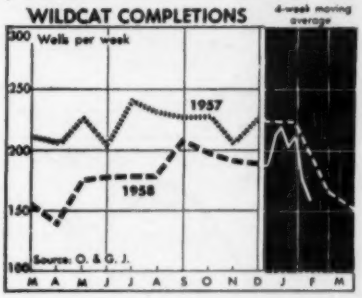
Prices in both cases are in terms of 1947-49 dollars.

Active Rotary Rigs *

	2-16-59	2-9-59	2-17-58
Alabama	8	8	8
Arkansas	13	13	22
Arizona	....	....	1
California	77	70	82
Land	74	67	(†)
Offshore	3	3	(†)
Colorado	25	26	37
Florida	1	1	1
Illinois	15	24	42
Indiana	1	4	5
Iowa	3	3	3
Kansas	134	131	121
Kentucky	3	5	9
Louisiana	304	297	325
North	27	31	31
S.-Inland waters	140	128	(‡)
S.-Land	98	101	232
Offshore	39	37	62
Maryland	1	1	....
Michigan	17	17	9
Missouri	....	....	....
Montana	20	16	27
Mississippi	57	52	41
Nebraska	18	21	20
Nevada	....	....	....
New Mexico	94	97	108
New York	....	....	1
North Dakota	27	28	34
Ohio	2	2	2
Oklahoma	213	202	186
Oregon	....	....	....
Pennsylvania	11	11	12
South Dakota	1	1	....
Texas	693	685	718
S.-Inland waters	8	8	(‡)
S-Land	124	129	154
Offshore	1	2	4
North-East	158	162	(†)
West Central	263	250	(†)
West	139	134	(†)
Utah	33	28	40
Washington	1	1	....
West Virginia	3	2	4
Wyoming	51	49	53
Total U. S.	**1,826**	1,795	1,911
Western Canada	222	222	241
Eastern Canada	....	....	....
Grand total	2,048	2,017	2,152

*Hughes Tool Co. †Comparisons not available due to change in method of reporting. ‡Included in South-Land.



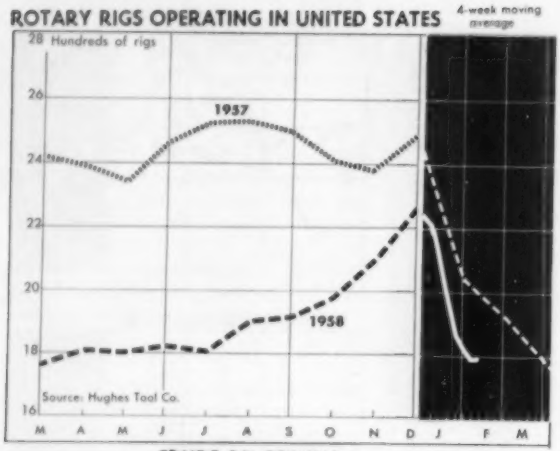


WEEKLY WELL COMPLETIONS . . . WEEK ENDED FEBRUARY 14, 1959

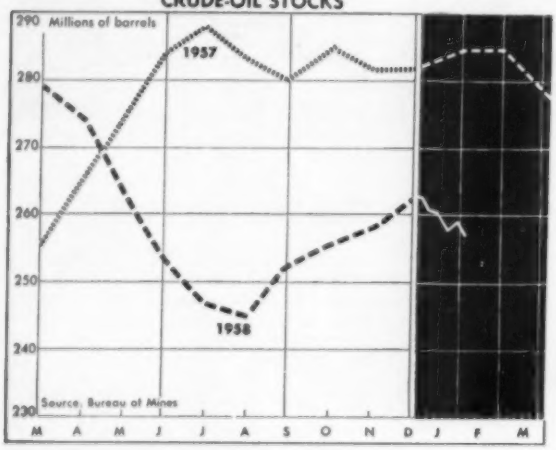
	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1959	1958	Total	Crude	Cond.	Gas	Dry	1959	1958
Alabama	2	1	0	0	1	0	13,607	19	9	1	0	0	0	1	3	5
Arkansas	17	11	0	0	6	0	55,611	130	102	2	0	0	0	2	26	19
California	34	21	0	3	10	0	166,322	217	271	11	1	0	1	9	56	48
Colorado	10	2	0	2	6	0	61,111	94	84	3	0	0	0	3	47	46
Illinois	45	16	0	0	23	6	82,822	325	256	6	0	0	0	6	52	54
Indiana	14	2	0	0	12	0	20,456	89	81	5	0	0	0	5	27	28
Kansas	69	28	0	8	28	5	233,104	553	502	13	0	0	0	13	130	113
Kentucky	37	16	0	9	12	0	44,135	202	120	2	0	0	0	2	16	15
Louisiana	49	27	2	1	19	0	399,312	466	454	5	1	0	0	4	72	57
North	16	9	0	1	6	0	70,195	168	153	3	1	0	0	2	37	25
South	27	15	1	0	11	0	274,494	250	237	2	0	0	0	2	34	29
Offshore	6	3	1	0	2	0	54,623	48	64	0	0	0	0	0	1	3
Michigan	7	3	0	1	3	0	18,025	70	44	0	0	0	0	0	20	15
Mississippi	5	0	3	0	2	0	47,422	92	64	1	0	0	0	1	46	37
Montana	3	0	0	0	3	0	22,327	37	62	3	0	0	0	3	12	34
Nebraska	10	4	0	0	6	0	60,205	82	84	5	0	0	0	5	36	43
New Mexico	49	32	1	10	6	0	191,057	232	324	3	1	1	0	1	23	55
New York	0	0	0	0	0	0	0	52	75	0	0	0	0	0	1	5
North Dakota	8	5	0	0	3	0	49,243	57	51	0	0	0	0	0	12	17
Ohio	25	7	0	7	9	2	62,136	110	115	2	1	0	0	1	4	3
Oklahoma	106	56	1	8	34	7	328,835	697	993	14	4	1	3	6	123	143
Pennsylvania	59	15	0	31	7	6	177,166	59	16	1	0	0	0	1	1	1
Texas	311	162	15	23	106	5	1,419,434	2,515	2,563	62	5	1	0	56	488	540
Dist. 1	19	10	1	1	7	0	53,353	187	121	3	0	0	0	3	45	50
Dist. 2	6	2	2	0	2	0	38,533	105	83	2	0	1	0	1	33	22
Dist. 3	21	7	3	1	10	0	145,924	153	182	8	0	0	0	8	50	31
Dist. 4	25	5	6	3	11	0	170,092	185	171	7	2	0	0	5	55	57
East	25	16	2	0	7	0	122,443	150	191	6	1	0	0	5	37	52
Dist. 7-B	38	14	0	2	21	1	97,331	311	308	13	1	0	0	12	94	99
West	97	77	0	0	20	0	569,524	791	766	10	0	0	0	10	85	117
Dist. 9	52	23	0	0	25	4	128,329	445	560	11	1	0	0	10	72	95
Dist. 10	28	8	1	16	3	0	93,905	188	181	2	0	0	0	2	17	17
Utah	9	4	0	0	5	0	50,528	45	57	2	0	0	0	2	12	10
West Virginia	15	2	0	11	2	0	43,766	97	92	1	0	0	1	0	3	3
Wyoming	15	4	0	0	11	0	71,070	110	103	8	0	0	0	8	47	44
Misc.	0	0	0	0	0	0	0	11	20	0	0	0	0	0	8	15
Total U. S.	**899**	418	22	114	314	31	3,617,694	6,361	6,542	**150**	13	3	5	129	1,265	1,350
Previous week	852	452	23	48	298	31	3,749,309	.....	.....	152	20	2	9	121	.....	.....
Cum. 1959	6,361	3,166	169	445	2,408	173	26,946,141	.....	.....	1,265	121	18	45	1,081	.....	.....
Western Canada	38	16	0	3	18	1	193,154	263	303	13	1	0	1	11	88	96

PRODUCTION

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	2-7-59	1-31-59	2-8-58
Pennsylvania	2,561	2,539	2,956
Other Appalachian	1,418	1,597	1,573
Illinois, Indiana, Michigan	9,535	9,675	11,457
Nebraska and North Dakota	2,204	2,132	2,520
Kansas	9,343	9,450	9,587
Oklahoma	16,085	16,551	18,940
Arkansas	2,135	1,956	2,610
Louisiana	17,187	16,948	19,927
North	3,037	3,062	3,065
South	14,150	13,886	16,862
Mississippi, Alabama, Florida	2,381	2,482	2,816
New Mexico	8,877	8,823	9,197
Texas	114,938	115,938	123,026
East Texas	8,898	8,814	9,469
West Texas	56,335	57,132	53,757
Texas Gulf	19,513	19,622	26,085
Other Texas	30,192	30,370	33,715
Wyoming	13,049	13,469	14,141
Other Rocky Mountain	9,176	9,575	6,716
California	33,616	34,485	32,386
Foreign	†14,733	14,050	16,130
Total	**257,238**	259,670	278,982

*Bureau of Mines. †Includes 5,558,000 bbl. in California.

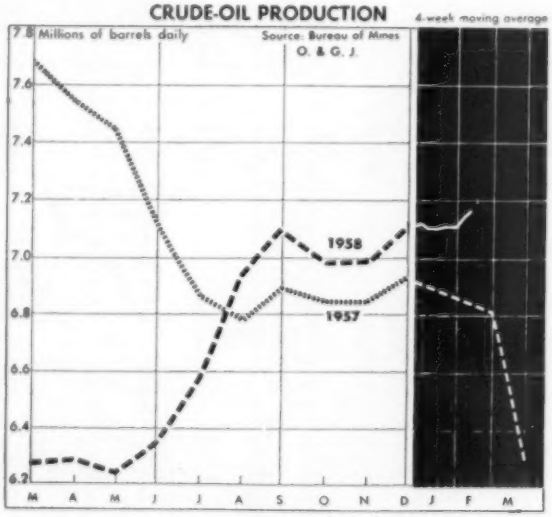
DAILY AVERAGE PRODUCTION FOR WEEK

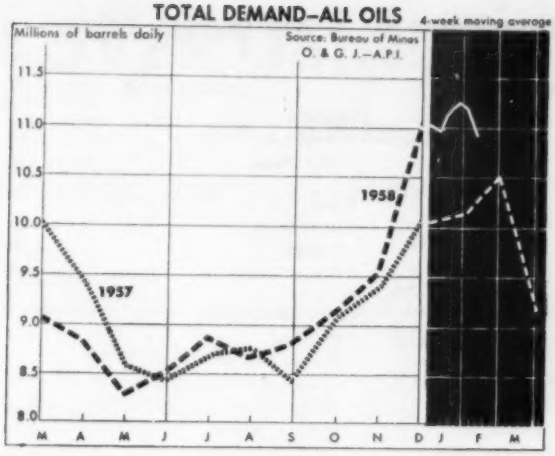
	February 14, 1959			Feb. 7
	Crude oil	Lease condensate	Total	total
Alabama	15,500	.....	15,500	15,425
Arkansas	77,175	150	77,325	77,250
California	846,800	.....	846,800	848,600
Colorado	128,700	.....	128,700	128,300
Eastern	40,300	.....	40,300	39,100
Florida	1,250	.....	1,250	1,250
Illinois	221,900	.....	221,900	224,200
Indiana	33,400	.....	33,400	32,400
Kansas	†318,338	.....	†318,338	†329,654
Kentucky	64,500	.....	64,500	64,500
Louisiana	842,500	100,475	942,975	942,900
North	111,500	3,975	115,475	115,400
South	731,000	96,500	827,500	827,500
Michigan	24,700	.....	24,700	24,700
Mississippi	116,500	5,200	121,700	121,700
Montana	79,100	.....	79,100	78,600
Nebraska	60,000	.....	60,000	59,400
Nevada	100	.....	100	100
New Mexico	284,500	6,100	290,600	290,600
North Dakota	36,900	.....	36,900	34,800
Oklahoma	†536,300	.....	†536,300	†580,700
Texas	2,812,000	70,500	2,882,500	2,882,500
Dist. 1	43,000	2,000	45,000	45,000
Dist. 2	122,000	8,300	130,300	130,300
Dist. 3	386,000	34,000	420,000	420,000
Dist. 4	199,000	8,500	207,500	207,500
Dist. 5	32,000	500	32,500	32,500
Dist. 6	124,000	7,400	131,400	131,400
East Texas Field	162,000	.....	162,000	162,000
Dist. 7-B	144,000	150	144,150	144,150
Dist. 7-C	140,000	3,750	143,750	143,750
Dist. 8	1,145,000	3,000	1,148,000	1,148,000
Dist. 9	208,000	1,900	209,900	209,900
Dist. 10	107,000	1,000	108,000	108,000
Utah	110,000	.....	110,000	109,400
Wyoming	334,700	.....	334,700	333,900
Others	‡325	.....	‡325	‡325
Total U. S.	6,985,488	182,425	**7,167,913**	7,220,304
Change from prev. week, down			**52,391**	
Canada	†582,700	.....	†582,700	†505,400

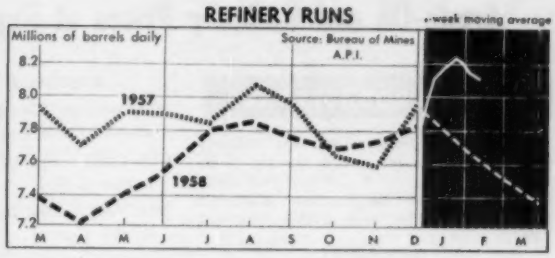
Total U. S. production—January 1-February 14 ... 321,440,920 bbl.
Same period last year (crude plus cond.) ... *308,348,491 bbl.

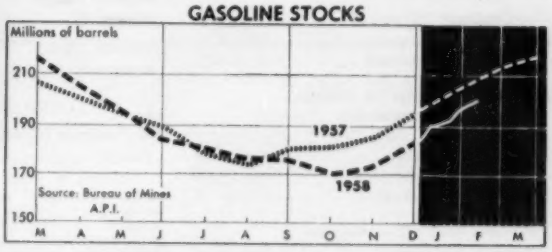
*Includes 7,338,525 bbl. condensate. †Week ended previous Monday. ‡South Dakota, Washington, and Arizona.

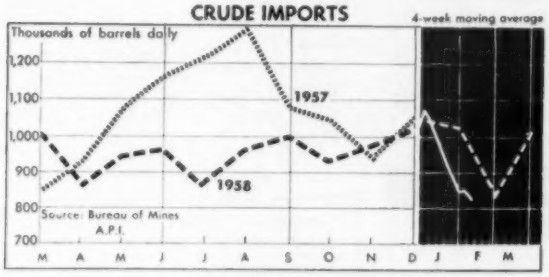
CRUDE-OIL PRODUCTION

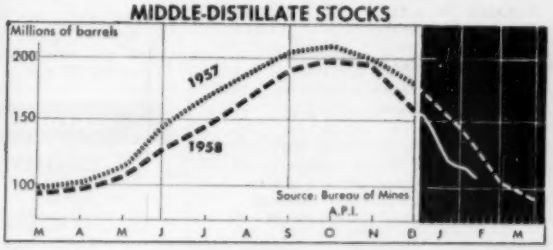


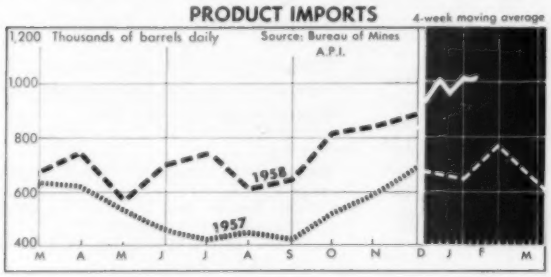

TOTAL DEMAND—ALL OILS
4-week moving average
Millions of barrels daily
Source: Bureau of Mines
O. & G. J.—A.P.I.
1957
1958
M A M J J A S O N D J F M

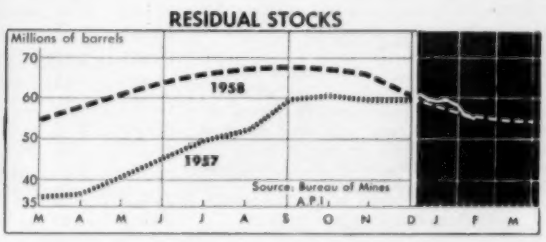












API REFINERY REPORT—FEBRUARY 13, 1959
(Thousands of barrels)

District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, February 1958—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,195	545.1	53.7	443.0	179.3	42,538	9,084	30,851	10,517	1,123	474.2	34.9	313.7	187.4
Appalachian:														
Dist. 1	100	42.4	5.6	22.6	13.6	4,871	437	2,142	258	99	40.1	5.6	24.7	10.7
Dist. 2	115	56.3	8.6	21.0	20.1	2,820	294	743	286	110	54.7	6.3	22.9	12.6
Ind., Ill., Ky.	1,409	649.1	99.6	396.6	166.6	34,384	3,969	13,451	3,437	1,462	708.0	81.0	347.0	211.5
Minn., Wis., Dak.	107	52.3	9.4	18.7	18.3	6,620	672	3,932	473	108	50.7	7.0	28.4	14.1
Okla., Kans., Mo.	790	430.9	25.8	204.4	49.0	20,802	941	7,872	836	724	394.1	20.3	175.1	38.7
Inland Texas	267	194.9	7.9	50.6	21.3	8,465	265	1,268	2,162	266	194.8	8.4	53.0	21.1
Texas Gulf Coast	1,769	814.0	127.3	588.3	209.1	28,396	1,813	8,896	5,903	1,676	864.4	140.5	423.6	196.0
La. Gulf Coast	725	351.1	71.3	195.7	48.0	12,274	997	3,978	1,465	597	355.7	63.0	128.4	45.0
N. La. and Ark.	99	44.0	6.8	21.6	4.0	4,920	904	1,494	49	80	31.4	5.0	17.3	8.5
Rocky Mountain:														
New Mexico	24	12.9	0.1	3.3	2.6	678	36	156	26	22	9.1	0.3	4.0	3.2
Other Rky. Mt.	285	133.1	4.3	63.0	33.1	6,410	197	2,451	759	270	134.5	3.4	63.2	35.2
West Coast	1,069	497.0	1.3	174.1	285.6	26,942	344	11,021	29,475	987	455.1	4.6	119.3	325.0
Feb. 13, 1959	7,954	3,823.1	421.7	2,202.9	1,050.6	200,120	19,953	88,255	55,646	7,524	3,766.8	380.3	1,720.6	1,109.0
Feb. 6, 1959	8,025	3,844.7	414.7	2,144.1	965.9	198,908	20,649	92,018	55,824	.....	.....	.....	.....	.....
Feb. 14, 1958	7,520	3,794.1	374.1	1,708.7	1,089.3	210,560	20,487	108,417	57,134	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (89 octane)	11.25-11.625
Premium (99 octane)	14.25-14.625
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	9.875-10.25
Regular (92 octane)	10.125-10.50
Premium (97 octane)	11.25-11.625
Premium (98 octane)	11.375-11.75
California (rack) (Los Angeles):	
Regular (88 octane)	12.00-12.60
Premium (94 octane)	13.00-14.60
Premium (98 octane)	14.00-15.70
Caribbean area (cargoes):	
Regular (87 octane)	9.875
Premium (97 octane)	11.625

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	4.5
Breckenridge:	
Grade 26-70	4.0

*If 26-70 natural is considered as 100%, prices for lower-vapor-pressure grades increase 2.5% for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	11.00
Diesel oil (58 d.i. and above)	10.75
Distillate No. 1	10.75
Distillate No. 2	10.00
Gulf Coast (cargoes):	
Kerosine 41-43	10.375
Distillate No. 2	9.875
New York Harbor (barges):	
Kerosine 41-43	11.50
Distillate No. 2	11.00
Diesel fuel, 48-52 d.i.	11.25
Caribbean area (cargoes):	
Distillate No. 2	9.875

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank car	6.50
New York (export):	
126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
★Residual fuel (max. 1% S)	$2.00-2.05
Gulf Coast (cargoes):	
Bunker C fuel	$2.00
New York Harbor (barges):	
Bunker C fuel	$2.37
Caribbean (cargoes):	
Bunker C	$2.00
California (rack):	
Bunker C fuel, Los Angeles	$2.15

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 pp., 95 v.i.	23.0
200 vis. neutral oil, solvent refined, 0-10 pp., 95 v.i.	20.5
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	22
200 vis. neutral (180° at 100°), 25 p.t.	21

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Okla-homa*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour)
14-14.9	$1.86	....	....	....	....
15-15.9	1.95	....	....	....	$1.81
16-16.9	2.04	....	....	....	1.86
17-17.9	2.13	....	....	....	1.91
18-18.9	2.23	....	....	....	1.96
19-19.9	2.32	....	....	....	2.01
20-20.9	2.41	$2.52	....	$2.35	2.06
21-21.9	2.50	2.55	....	2.38	2.11
22-22.9	2.60	2.58	....	2.41	2.16
23-23.9	2.69	2.61	$3.44	2.44	2.21
24-24.9	2.78	2.64	3.46	2.47	2.26
25-25.9	2.84	2.67	3.48	2.50	2.31
26-26.9	2.90	2.70	3.50	2.53	2.36
27-27.9	2.95	2.73	3.52	2.56	2.49
28-28.9	3.01	2.76	3.54	2.59	2.54
29-29.9	3.07	2.79	3.56	2.62	2.59
30-30.9	3.12	2.82	....	2.65	2.63
31-31.9	3.20	2.85	....	2.68	2.67
32-32.9	3.27	2.88	....	2.71	2.71
33-33.9	3.34	2.91	....	2.74	2.75
34-34.9	3.41	2.94	....	2.77	2.79
35-35.9	3.47	2.97	....	2.80	2.83
36-36.9	3.52	3.00	....	2.83	2.87
37-37.9	3.56	3.02	....	2.86	2.89
38-38.9	....	3.04	....	2.89	2.91
39-39.9	....	3.06	....	2.92	2.93
40-40.9	....	3.08	....	2.95	2.95

*Another Oklahoma (sweet) schedule has a top of $3.05 with different gravity variations to $2.34 for below 20°. †Low cold test crude. ‡Sour.

Effective dates of broad changes: California, 1-26-59; East of California, January 3-10, 1957; Pennsylvania Grade 12-22-58.

FLAT PRICES

Louisiana:	
Sweet Lake	$3.00
Ville Platte	3.30
Texas:	
East Texas	3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
Bradford	4.05
Middle District	3.87
Southwest Pennsylvania	3.58
West Virginia	3.40
Buckeye Grade	3.25
Illinois Basin	3.00
Canada:	
Leduc-Woodbend	2.67
Redwater (Alta.)	2.56
Smiley (Sask.)	2.33
Pembina	2.52

FOREIGN

Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.51
San Joaquin, 41°-41.9°, Puerto La Cruz	3.25
Oficina, 35°-35.9°, Puerto La Cruz	2.90
Tia Juana medium, 26°-26.9°, Amuay*	2.40
Quiriquire, 16.0°-16.4°, Caripito	2.15
Lagunillas heavy, flat, Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.93

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes f.o.b. lifting port):	
★ Arabian, about 34°, Ras Tanura	$1.89
★ Iranian, 34.0°-34.9°, Bandar Masur	1.86
★ Iranian, 34.0°-34.9°, Abadan	1.81
★ Iraq, 30.0°-36.9°, Fao	1.82
★ Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.67
★ Qatar, about 41°, Um Said	2.05
Middle East, E. Mediterranean:	
★ Arabian, about 35°, Sidon	2.29
★ Iraq, about 35°, Tripoli, Banias	2.29
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.75

TANKER RATES PER LONG TON

(Latest reported spot fixtures)

★ Gulf-U.S.N.H., clean (ATRS —5%)	$2.71
★ Gulf-U.S.N.H., dirty (ATRS Flat)	2.85
★ Carib.-U.K., clean (Scale —40%) (19s. 6d.)	2.73
★ Carib, U.S.N.H., clean (USMC —47.5%)	1.42

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USED PIPE AND USED TANKS—For Sale. Rogers & Wright, Incorporated, 216 West Second Street, Tulsa, Oklahoma; 710 Peoples Building, Charleston, West Virginia.

ONE NEW BS&B gas heater with four inch coils, 1200 lb. working pressure to handle 20,000 MCF per day and two 500 barrel storage tanks in good condition complete with stairs, vents, valves and lines. Write Box 311, Hammond, Louisiana.

FOR SALE—Bucyrus-Erie, 36L, good condition. 10" to 4" tools, steel doghouse, lightplant, 100 bbl. water tank, 500 gal. butane tank; White winch truck; 30' tandem float; many extra fishing and drilling tools. Everything goes. Now drilling. Phone 422, Caney, Kansas, after 6:00 P. M.

ROTARY DRILLING RIGS
AT .50 PER FOOT

A real opportunity for those with drilling experience, clear financial record and working capital for current operating expenses. Please inform us regarding capacity and type of rig needed.

Cardwell Investment Company, Inc.
804 Petroleum Building, Phone AM 5-2611
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7—400 H.P. Cooper-Bessemer Type GN8G STB, size 11½" x 13½" @ 400 R.P.M. direct connected to
7—250 KW General Electric Type AT-1-18-312-400, 3 phase, 60 cycle, 4160 volts, .8 P.F., 400 R.P.M., Form A Electric Generators. Belted to 7 120 volt DC Excitors.

Used Condition—Parts for Above
Priced attractively for quick sale from Hardin City, Oklahoma.

C. J. SMITH
305 Oil Capitol Bldg., Phone LUther 3-5516
Tulsa, Oklahoma.

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SACRIFICE Ingersoll-Rand 4-XVG 150 h.p. Compressor. Complete installation including 20' x 22' building. Guaranteed new condition. P. O. Box 1413, Corpus Christi, Texas.

SALES AND RENTALS. Used cable drilling and fishing tools, casing, production equipment; from the Southwest's largest stock of oil field supplies. Degen Pipe and Supply Co., Tulsa.

FULLY EQUIPPED, shallow oil Rotary Rig mounted on Float. Three Trucks, Pipe Trailer, clean, ready to work. Owing to death of owner this equipment priced to sell. Write for invoice. Mrs. Clarence McFaull, Phone 982. P. O. Box 495, Bastrop, Texas.

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OILWELL Model DGE-175 Duplex with accessory equipment. Skid mounted. Two 4¼"x11" double acting cylinders for single stage operation. Waukesha Model 6-NKRU 72 x 8¼" gas engine. Located in Pennsylvania. For price and complete details write

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3—230 H.P. Cooper-Bessemer Type 12 Horizontal Twin Gas Engine Compressors complete. Direct connected to 14½" x 20", 10½" & 6" x 20" compressor cylinders for three stage operation.

Used Condition—Priced Attractively. Prompt Shipment from Hardin City, Oklahoma.

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305 Oil Capitol Bldg. Phone LUther 3-5516
Tulsa, Oklahoma

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RA-4 CLARK, 400 BHP engine, Farrel-Birmingham S1-30/10 right hand speed increaser, Goulds Fig. 3360, 4 inch, 8 stage, right hand Std. bronze fitted pipe line pump. Alfred B. Kern, 305 Kennedy Bldg., Tulsa, Oklahoma.

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8" Steel, Wt. 28 lbs., beveled for welding, straight machine cleaned, coated, strictly No. 1 grade. Pittsburgh Testing Lab. report furnished.

Indiana-Ohio Pipe Co.
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Hamilton	3	68SA	400	6	900
General Motors	2	12-567	1000	12	720

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6'x36' 10 Tr. 480#	2'x45' 24 Tr.
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4,600 ft. 16" O.D., .188" Wall, 31.66 lbs. Armco Spiralweld Steel Pipe, Manufactured to ASTM specification A-139, Grade B, lined, coated and wrapped in accordance with AWWA C-203 specifications. 50 ft. lengths with ends prepared for Dresser couplings.

Priced Attractively for Quick Sale from Jenks, Oklahoma.

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1. Joy 300 Trailer Rig w/7 x 10 G.D. Pump, 3½" D.P., Drill Collars, Dog House, etc., complete rig.
2. Emsco Type A-10 Triplex Pump, excellent condition.
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4. GD Slush Pump, 5 x 8, FD Model on 3 member skid w/sheave, guard, suction, L525 Buda power.
5. Rotary blowout preventer, Type E1 Guiberson Air Drilling pack-off rubbers.
6. Shale Shaker, Model "K," Linda—New.
7. Keystone 74 Trailer Mounted Spudder, 10" to 3" tools.
8. Used 4½" 9.5# CW Casing.
9. Used 3½" x 4½" Drill Pipe (Structural use).
10. Baker Cable tool core barrels #5 & 6 with parts.
11. Dowdco Diamond Core Barrel, 6¾" x 50' w/7¾" OD x 4⅜" I.D. diamond bit and tools.

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Good used 12¾" OD; 14" OD; 16" OD and 6" OD Plain End Line Pipe.

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Phone SH 4-7404,
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FOREIGN EMPLOYMENT: Lists about 40 U. S. oil companies, 30 drilling contractors, operating abroad, showing where apply foreign jobs. $5 cash. OIML Co. Box 2603, Tulsa, Okla.

PETROLEUM ENGINEER: Sales engineering position with progressive new company in Houston. Graduate of recognized petroleum school. Age 28 to 35. General field experience with major in Production and Gas. Some travel. Excellent growth opportunity. Submit detailed resume in confidence. Box L-191, The Oil and Gas Journal, Tulsa, Oklahoma.

ASST. MAINTENANCE ENGINEER to assist the maintenance engineer. Man selected should be a graduate engineer with five years refinery experience, three of which should have been as a maintenance foreman or in a responsible maintenance position. Salary commensurate with experience. Send resume to Box L-188, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING MUD SALESMAN—Gulf area Supervisory capacity, excellent opportunity for a man who is well acquainted with the purchasing personnel and end users of Barite. We own and operate our own domestic quality controlled mine. Our product is industry accepted. Salary and bonus. Send complete resume so that interview can be arranged. Our employees know of this ad. Box L-190, The Oil and Gas Journal, Tulsa, Oklahoma.

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SALES ENGINEER needed, for work with oil and gas industries in Rocky Mountain area. Experience in control equipment desirable. Some travel required. Excellent growth opportunities. Salary open. Send photograph and complete resume so interview may be arranged. Box L-213, The Oil and Gas Journal, Tulsa, Oklahoma.

TRANSLATORS. Proven ability to translate technical material into fluent English essential. Attractive full time or free-lance arrangement. All languages of interest, particularly Russian. Send resume to A.T.S., Inc., Drawer 271, East Orange, New Jersey.

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The Oil and Gas Journal, Tulsa, Oklahoma.

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MAINTENANCE ENGINEER to take complete charge of the maintenance department of an expanding 17,000 Bbl./d. modern refinery. Man selected should be a graduate engineer with seven to ten years refinery or petrochemical experience, four years of which should have been in a responsible maintenance or construction position. Send resume to Box L-189, The Oil and Gas Journal, Tulsa, Oklahoma.

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for independent refinery in north-central U. S. Requirements include thorough experience and demonstrated ability in planning and field supervision of refinery or petrochemical plant maintenance or construction. Excellent opportunity for mature energetic man. Attractive living conditions. Salary open. Reply to: George Armistead & Co., 1000 Connecticut Ave., Washington 6, D. C.

PETROLEUM ANALYST—Graduate chemist or chemical engineer with experience in a refinery or petroleum research laboratory wanted by a research corporation located in Florida, to perform analysis and treatment of crude oil, and research and development work on new equipment. Salary commensurate with experience and background. Excellent opportunity. Send photograph and complete resumé of experience, education, and salary requirements to Box L-147, The Oil and Gas Journal, Tulsa, Oklahoma.

AGGRESSIVE, GROWING Independent Oil Company needs graduate petroleum engineer with 4 to 6 years completion and production experience, preferably in Gulf-Coast, Mid-Continent areas. Successful applicant will live in Wichita Falls, Texas. Area of work will be North and South Louisiana, Central Oklahoma and West Texas. Send complete chronological resume of experience, education and salary required to Box L-209, The Oil and Gas Journal, Tulsa, Oklahoma.

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375 Lexington Avenue — New York 17, New York

HELP WANTED

GEOLOGIST—Independent Oil Producer wishes Geologist with experience in Northern Oklahoma and Southern Kansas. Write background, experience and qualification to Box L-197, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATION WANTED

FOREIGN ASSIGNMENT desired by drilling superintendent with administrative background, over 20 years continuous foreign experience. Box L-193, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, age 47, nine years experience Colombia, Venezuela, Portugal, Egypt; three years Rocky Mountain area. Chiefly regional surface studies. Fluent Spanish, Portuguese. Wide experience in logistics. Desire responsible position preferably aggressive Independent entering foreign exploration. At present in foreign residence. Full resume on request. Box L-201, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 39, 14 years diversified experience drilling, producing, reservoir, remedial operations on Gulf Coast. Box L-200, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: Age 30, Registered, 5 years with major in Texas Gulf coast, desires position with independent in Gulf Coast or North Texas. Box L-202, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION ENGINEER: ICS engineer; 11 years one company, area supervisor, reservoir tester, plant supervisor, pipe-line engineer, gas tester, and draftsman. Box L-206, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMIST (M.S.)—some research, sales experience. Resourceful, tactful, producer, seeks challenge. Canadian, 30, relocate. P. MacKenzie, 2715 Cochrane Road, Calgary, Canada.

PURCHASING AGENT—Eighteen years diversified experience as Purchasing Agent in the procurement of drilling, production, refining, and marketing materials, supplies, and equipment. Also possesses oil well supply company and accounting experience. Good health and habits. Brochure on request. Prefer Wichita Falls, Texas area. Consider relocating. Best references. Available now. Box L-205, The Oil and Gas Journal, Tulsa, Oklahoma.

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PIPELINE ENGINEER: Graduate mechanical. Ten years pipeline experience; products and gas. Desires responsible position with established company in U. S. Box L-137, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER. Age 37. Twelve years experience major companies in all phases of natural gasoline and cycling plants, pipelines and compressor stations. Supervisory experience. Some chemical plant work. Familiar with gas and products sales contracts. Desire responsible position in Southwest. Box L-215, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES AGENT: Mechanical Engineer with wide chemical processing experience wants to represent manufacturer of processing or mechanical equipment in Tulsa area. Box L-179, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY OPERATIONS—Young man now employed as Shift Foreman desires foreign assignment. Eleven years domestic and foreign operating experience. Box L-214, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER—Thirteen years oil and gas production, design and installation of gas gathering systems and gasoline plants, sales engineering, supervision and management. Desire management of production and development for aggressive independent. Box L-204, The Oil and Gas Journal, Tulsa, Oklahoma.

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WANTED: Oil properties. 100 to 5,000 barrels daily in Oklahoma and Kansas. Morris Sitrin, P. O. Box 1100, Tulsa, Okla.

UNLIMITED FUNDS for purchase of oil and gas properties or producing company in North, West, West-Central Texas. Negotiations in strictest confidence. Box 743, Abilene, Texas.

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LEASE AND DRILLING BLOCKS

WANT SHALLOW ACREAGE for three well test program, offset or extension, preferably farmout. Write U. S. Anderson, 8350 Santa Monica Blvd., Los Angeles 46, California.

5,000 A. FOR TEST—near production Clark Co., Illinois. No cash—small O.R. W. V. Tarman—Martinsville, Illinois.

WANTED—Oil & Gas Lease Bids from producers only. 160 acres, 22-17-30 Black Mesa Basin, Apache County, Arizona. 160 acres, 10-26-24 Paradox Basin, Grand County, Utah. Carlos E. Radcliffe—2507 Graham Ave. Evansville, Indiana.

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FOR LEASE for Oil and Gas—5,000-10,000 or 15,000 acres west part Vernon County, Missouri, at $1.00 per acre per year. Clarence Heitz—Arcadia, Kansas.

WELL FINANCED independent oil company wants outstanding drilling ventures; preferably offset to production. Box L-208, The Oil and Gas Journal, Tulsa, Oklahoma.

⅛ INTEREST in 40 acre offset to production five hundred seventy-five feet well, Sorona sand. Well ready to drill—Box 628—Okmulgee, Oklahoma.

4000 ACRES of oil and gas leases in San Miguel, San Doval, Torrance, Lincoln, Chavis and Debaca counties, New Mexico. Also, one section of mineral lease in Santa Fe County. All are for out right sale or drilling contract. Full description or photostatic copies furnished on request. Write Box L-180, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED WASTE OIL

WANT TO BUY from individuals or companies waste oil of any kind in any amount. Inquiries to Red River Oil Purchasing Co., Box 68, Kingston, Oklahoma.

BUSINESS OPPORTUNITIES

Large or Small Oil Operators

If you have production and would be willing to turn this into a Corporation being readied up for financing for a stock interest, please contact us immediately. Some cash consideration can be arranged after financing. Also small Corporations that would be better off merging are invited to write for full details. Box L-212, The Oil and Gas Journal, Tulsa, Oklahoma.

WANT TO PURCHASE—Entire business or active partnership in light manufacturing, wholesale concern, or distributorships connected with oil business. Box 31 RO 532, The Oil and Gas Journal, 4041 Marlton Ave., Los Angeles, California.

EASTERN AREA Producer-Contractor desires contact with parties interested in developing their drilling deals in Ohio. Equipped to manage and care for oil or gas production and offer engineering and geological services. Box L-203, The Oil and Gas Journal, Tulsa, Oklahoma.

NEW SERVICES WANTED

Well-established service company with facilities and personnel desires additional services or products to distribute to the oil industry in Lower Texas Gulf Coast.

Box L-177, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE AND DRILLING BLOCKS

FOR SALE—Minerals in Montana portion Williston Basin. Howard Helmer, Box 385, Poplar, Montana.

FOR SALE—Government 40 acre oil leases in Arizona, N. M. & Calif. You do no drilling yet. You share in fortunes made from oil on public lands. Payments if desired. Free information & maps of booming areas. Bids now accepted via mail. Universal Investors Corp. 30 W. Washington Street, Chicago 2, Illinois.

Green County, Kentucky

Boom Area Leases—in fairway, 4400 acres in large or small blocks. Some direct offsets or close to production. Low lease costs for immediate drilling deals. Write for full particulars.

Box L-183, The Oil and Gas Journal, Tulsa, Oklahoma.

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GRADUATE FELLOWSHIPS in petroleum engineering starting September 15, 1959. Stipends from $800 to $1800 plus tuition. Reply, Graduate Advisor, Department of Petroleum Engineering, University of Texas, Austin, Texas.

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MAin 4-3861 — **LIBERAL, KANSAS**

(Continued from page 198)

Louisiana gets new Tuscaloosa pay

TUSCALOOSA SAND is being found productive in a new area in northern Catahoula Parish, East Central Louisiana.

Its discovery well, drilled by Jett Drilling Co., is 3 miles southwest of Enterprise, and 9 miles northwest of Harrisonburg. Spot location is in 2-10n-5e, at 1-B Louisiana Central Minerals. Nearest production is at Harrisonburg.

The well has 40 ft. of net pay section in the Tuscaloosa (Upper Cretaceous) with perforations at 7,806-13 ft. Completion is with a flow rate of 160 bbl. of 41.5°-gravity oil per day through 11/64-in. choke. Gas-oil ratio is 954 cu. ft. per bbl., and flowing pressure 750 psi.

Hole was drilled to 7,943 ft.

Another Tuscaloosa discovery is indicated in a wildcat 4 miles southeast in 17-10n-6e, about midway between the Jett well and Harrisonburg. There, A. J. Hodges Industries, Inc., and associates are preparing to test showings encountered in an open-hole drill-stem at 7,942-80 ft. in their 3-A Louisiana Central.

With testing tool open 20 minutes through ⅝-in. bottom and ¼-in. top chokes, the well filled 1,520 ft. with 41°-gravity oil. Bottom-hole pressure, flowing, was 750 to 1,175 psi. No water was indicated.

Since then hole has been deepened to 8,100 ft. and oil-string run through the section to 8,093 ft.

Gas well completed in Kentucky

In the Pike County sector of Big Sandy gas field on Bucklick Fork of Left Fork of Long Fork, Kentucky West Virginia Gas Co. has completed 6,452 William Johnson as a good Big Lime (Mississippian) gas producer. On initial potential well flowed naturally at the rate of 3,603 M.c.f.d. of gas from a total depth of 3,073 ft. Rock pressure was 520 psi. in 12 hours.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Eastern States Land Office, Washington 25, D. C. Notice is hereby given that approximately 48.52 acres of land in one parcel within the known geologic structure of the Elm Grove Field, Louisiana, will be offered for competitive oil and gas leasing through sealed bids to the qualified bidder of the highest cash amount per acre at 1:00 P.M., E.S.T. March 11, 1959 when bids will be opened. Full details of the lease offering, and how and where to submit bids, may be obtained from the Manager, Eastern States Land Office, Bureau of Land Management, Washington 25, D. C.

ADVERTISERS

A

Air-Maze Corporation 58
Airaterra 155
Allis-Chalmers—
Construction Machinery Division 17, 18, 19
American Iron & Machine Works Co. Back Cover

B

BJ Service, Inc., A Borg-Warner Subsidiary 98
B-K-L Alloys, Ltd. 161
Baash-Ross Division of Joy Manufacturing Company 49
Baker Oil Tools, Inc. 83
Baroid Division, National Lead Co. 163
Bethlehem Steel Company 150
Black, Sivalls & Bryson, Inc. 135
Braden Winch Company 173

C

Cameron Iron Works, Inc. Inside Back Cover
Canadian Industries, Limited 158
Chiksan Company 20
Classified Advertising 207, 208, 209, 210
Colorado Fuel and Iron Corp. 131
Continental-Emsco Company, a Division of the Youngstown Sheet and Tube Company ..... 21 through 28
Cooper-Bessemer Corp., The 68, 69
Core Laboratories, Inc. 182
Crose Manufacturing Co., Inc., M. J. 70
Crossett Chemical Company Division of The Crossett Company 189
Cummins Sales & Service, Inc. 172

D

Darling Valve & Manufacturing Co. 11
Dowell 1, 191
du Pont 39

E

Edward Valves, Inc. 63

F

Falk Corporation, The 30
Floridin Company 157
Foxboro Company, The 55
Franks Division of Cabot Shops, Inc. 60, 61

G

Garrett Oil Tools, Division U.S. Industries, Inc. 170
Grant Oil Tool Company 38
Grinnell Company, Inc. 7
Grove Valve and Regulator Company 52

H

H & M Pipe Beveling Machine Co. 161
Halliburton Oil Well Cementing Co. 8, 9
Harbison-Fischer Mfg. Co. 178
Harvey & Co., Ltd., G. A. 44
Houston Contracting Company 154
Houston Tool Company 177
Hudson Engineering Corporation 95
Hughes Tool Co. 96, 97

I

International Paints, Ltd. 188

J

Japan Steel & Tube Corporation 59
Jones & Laughlin Supply Division 42, 43

K

Kinney Engineers, Inc., S. P. 143
Kinzbach Tool Co., Inc. 54

L

Lane-Wells Company ..... Inside Front Cover
LeBus International Engineers, Ltd. 192
Lehman Brothers 171
Liberty National Bank & Trust Co. 177
Lone Star Steel Company 126, 127

M

M & V Tank Company 158
Mack Trucks, Inc. 33
Magnet Cove Barium Corp. 12, 13
Marsh Instrument Co. 36
Martin-Decker Corp. 59
McKissick Products Corporation 5
Mid-Continent Supply Company 16
Milwhite Mud Sales Company 164
Mission Mfg. Company 175
Moore Corporation, Lee C. 146
Mountain Iron and Supply Company 138

N

National Supply Company, Subsidiary of Armco Steel Corporation 57
National Tank Company 212
National Tube Division 166, 167
Neill and Company, Inc., J. P. 143
Nippon Kokan k.k 59
Nordstrom Valve Division, Rockwell Manufacturing Company 50
Norris Manufacturer, Inc., W. C. 4

O

Oakite Products, Inc. 164
Oil Center Tool Co. 47
Oil Well Supply Division 6

P

Paris Distributor, Inc., Henry H. 128
Parkersburg Rig & Reel Co. 176
Petreco A Division of Petrolite Corporation 165
Petroleum Electric Power Association 51
Philadelphia Gear Corporation 35
Philco Corporation 34
Phoenix Manufacturing Company Division—Union Tank Car Company 40
Pipe Line Technologists, Inc. 156
Price Company, H. C. 64

R

Rector Well Equipment Co., Inc. 37
Reda Pump Company 192
Republic Steel Corporation 194, 195
Robbins & Myers, Inc. 159
Rockwood Sprinkler Company 32
Rust-Oleum Corporation 123

S

Sargent Engineering Corporation 141
Schlumberger Well Surveying Corp. 179
Security Engineering Division, One of the Dresser Industries 31
Servco 187
Shaffer Tool Works 86
Smith Oil Tool Co., H. C. 180
Southern California Oil Tool Company 169
Square D Company 10
Stoody Company 149
Swartwout Co. 172

T

Texsteam Corporation 58
Thompson Pump Company 143
Tretolite Company, A Division of Petrolite Corporation 15
Tube-Kote, Inc. 41

U

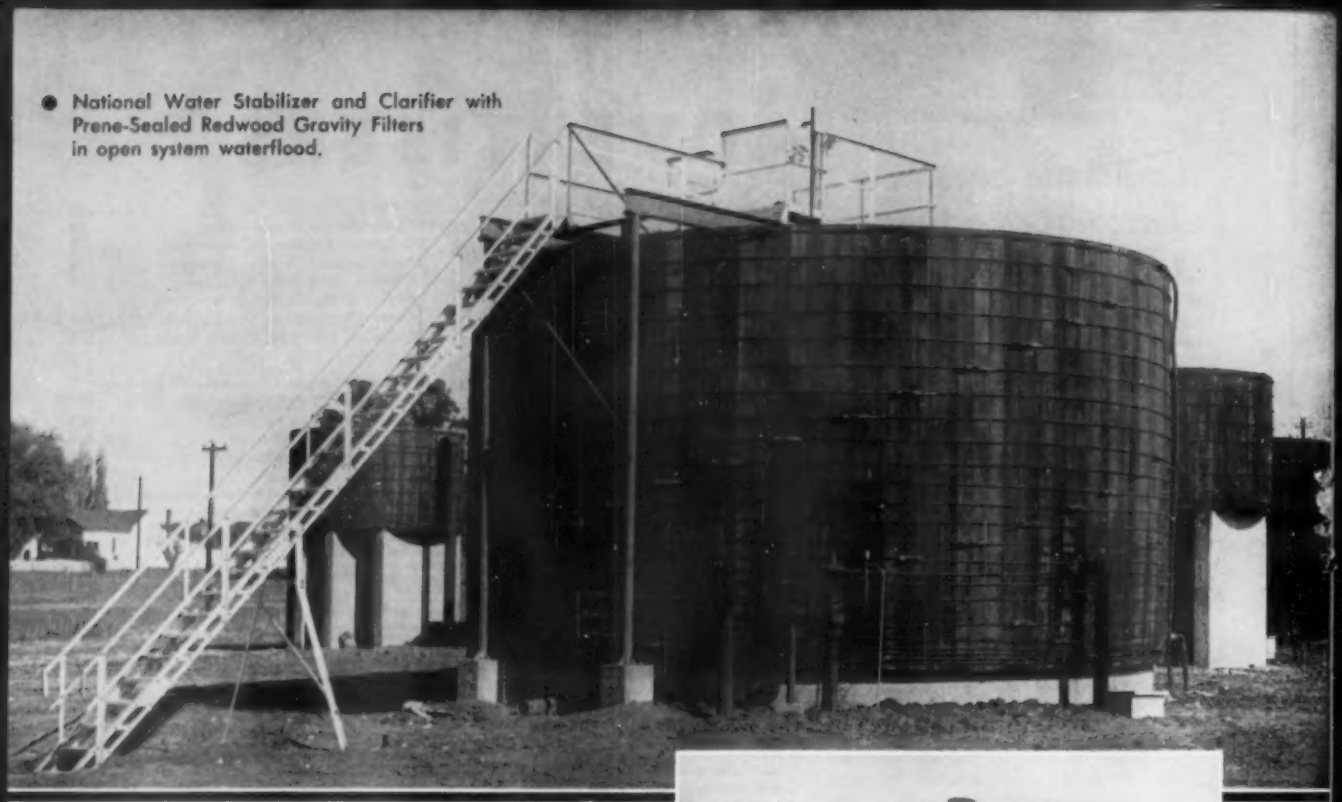
United States Rubber Company 48
United States Steel Corporation 53
National Tube Division 166, 167
Oil Well Supply Division 6
Universal Oil Products Co. 29

W

Warren Petroleum Corporation 66
Wash Overshot & Spear Engineers, Inc. 192
Watt Plumbing Air Conditioning Electric 58
Waukesha Motor Company 14
Well Equipment Mfg. Co. 56
Well Instrument Developing Co. 190
White Weld & Co. 193
Wichtex Machinery Company, Inc. 169
Wilson Supply Company 62
Wolverine Tube Division of the Calumet Hecla, Inc. 45, 46

Y

Yale Machine Works 168



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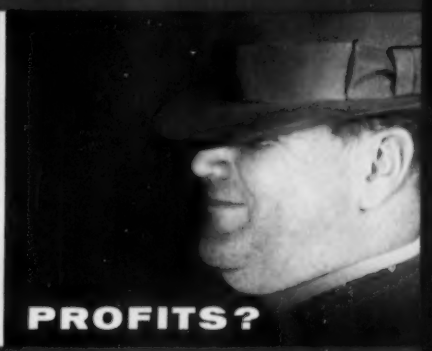

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